# NAVIGATING THE SHIFT

## A JUST TRANSITION ROADMAP FOR MAHARASHTRA'S AUTOMOBILE SECTOR

iFOREST
INTERNATIONAL FORUM FOR ENVIRONMENT, SUSTAINABILITY & TECHNOLOGY

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## A Just Transition Roadmap for Maharashtra's Automobile Sector

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| | |
|---|---|
| 2W | Two-wheeler |
| 3W | Three-wheeler |
| AAT | Advanced Automotive Technology |
| ACC | Advanced Chemistry Cell |
| ACDRI | Auto Cluster Development and Research Institute |
| ACM | Auto Component Manufacturers |
| ACMA | Automotive Component Manufacturers Association of India |
| AMP | Automotive Mission Plan |
| AMU | Aligarh Muslim University |
| APS | Aspirational Policy Scenario |
| ARAI | Automotive Research Association of India |
| BCD | Basic Customs Duty |
| CAGR | Compound Annual Growth Rate |
| CGTMSE | Credit Guarantee Scheme for Micro and Small Enterprises |
| CPS | Current Policy Scenario |
| CV | Commercial Vehicle |
| DGT | Directorate General of Training |
| DIC | District Industries Centre |
| DSV | Determined Sales Value |
| EV | Electric Vehicle |
| FAME | Faster Adoption and Manufacturing of Hybrid and Electric Vehicles |
| FCI | Fixed Capital Investment |
| GDP | Gross Domestic Product |
| GHG | Greenhouse Gas |
| GoI | Government of India |
| GSDP | Gross State Domestic Product |
| GST | Goods and Services Tax |
| ICE | Internal Combustion Engine |
| IIT | Indian Institute of Technology |
| IT | Information Technology |
| ITI | Industrial Training Institute |
| KKVK | Kiman Kaushalya Vikaas Kaarayakram |
| KPI | Key Performance Indicator |
| MaaS | Mobility as a Service |
| MACCIA | Maharashtra Chamber of Commerce, Industry and Agriculture |
| MCCIA | Mahratta Chamber of Commerce, Industry and Agriculture |
| MHI | Ministry of Heavy Industries |
| MIDC | Maharashtra Industrial Development Corporation |
| MoF | Ministry of Finance |
| MoHUA | Ministry of Housing and Urban Affairs |
| MoP | Ministry of Power |
| MoRTH | Ministry of Road Transport and Highways of India |
| MSDE | Ministry of Skill Development and Entrepreneurship |
| MSECDP | Micro and Small Enterprises Cluster Development Programme |
| MSME | Micro, Small and Medium Enterprises |
| MSRTC | Maharashtra State Road Transport Corporation |
| NAPS | National Apprenticeship Promotion Scheme |
| NCO | National Classification of Occupations |
| NEMMP | National Electric Mobility Mission Plan |
| NFTDC | Non-Ferrous Material Technology Development Centre |
| NIC | National Industrial Classification |
| NIT | National Institute of Technology |
| NOC | No Objection Certificates |
| NSDC | National Skill Development Corporation |
| NSQF | National Skills Qualification Framework |
| NULM | National Urban Livelihood Mission |
| OCEN | Open Credit Enablement Network |
| OEM | Original Equipment Manufacturers |
| PLI | Production Linked Incentive |
| PMEGP | Prime Minister's Employment Generation Programme |
| PMMY | Pradhan Mantri Mudra Yojna |
| PMKUVA | Pramod Mahajan Kaushalya Udyojakta Vikas Abhiyan |
| PMKVY | Pradhan Mantri Kaushal Vikas Yojana |
| PMP | Phased Manufacturing Programme |
| PSC | Parliamentary Standing Committee |
| R&D | Research and Development |
| RE | Renewable Energy |
| SME | Small and Micro Enterprises |
| TCO | Total Cost of Ownership |

# Summary for Stakeholders

**Maharashtra's industrial** economy is heavily reliant on the automobile sector. The sector's contribution to the gross state domestic product (GSDP) is about 7%, the highest among all manufacturing sectors and 15.3% of industrial GSDP. A transition of the automobile sector to cleaner technologies and fuels will be significant for decarbonising the state's industrial sector and strengthening climate change action. This shift also promises to usher in new opportunities and growth avenues for the state.

However, the transition poses challenges for businesses in the traditional auto industry, the workforce, and the environment. To mitigate these potential downsides, a sustainable and just transition of the automobile sector is essential.

## A. Leading India's EV Transition

**India's automobile sector is already experiencing the electric vehicle (EV) revolution. Maharashtra, India's automobile hub, remains a front-runner in the transition from internal combustion engine (ICE) vehicles to EVs given a conducive policy environment and industry investments.**

### Maharashtra accounts for 12.6% of total EV sales across India with the highest sales recorded for 2Ws and 4Ws in the country.

EV penetration in Maharashtra has increased drastically in the past three years, from just 0.4% share of all vehicle sales in 2020 to 7.6% by 2023. The state recorded the highest sales of EV cars and two-wheelers (2Ws) in the country. Overall, the state accounted for a total of 191,696 EV sales in the passenger vehicle segment—2Ws, three-wheelers (3Ws), and four-wheelers (4Ws)—which is 12.6% of India's total and second highest in the country. Considering only 2W and 4W sales, Maharashtra topped the chart.

### The combined implementation of the FAME II scheme and the state EV Policy has boosted EV adoption massively.

The policy environment for EV adoption has been particularly strengthened since 2021 with the enactment of the Maharashtra EV Policy and the existing Faster Adoption and Manufacturing of Electric Vehicles in India (FAME) scheme II remaining effective.

Given conducive policies, EV adoption has increased drastically in the last three years, from just 0.4% share of all vehicle sales in 2020 to 7.6% by 2023. Overall, the most significant number of registrations in 2023 was for 2Ws (87.6%), followed by 4Ws (6.4%) and 3Ws (6%). The state's charging infrastructure has also benefitted from these policies. The state has 3,079 public charging stations, the highest in India, constituting over 25% of the country's total.

### The public transport system is also experiencing EV penetration, with the state accounting for over 31% of the total e-buses deployed in the country.

Besides personal vehicles, electric buses (e-buses) have also been sanctioned under FAME in Maharashtra. A total of 1,110 buses have been sanctioned and 759 deployed. Out of this, 664 buses have been deployed under FAME II. The total deployment of e-buses in the state is also the highest, constituting over 31% of the country's total.

### Maharashtra remains the top beneficiary of the FAME II scheme and is also likely to leverage the benefits of the PLI scheme for automobile and auto components.

Over the last five years, Maharashtra has received ₹1,111.4 crores from FAME II scheme (since. the scheme's inception in 2019 until December 2023), combining various vehicle segments. This is about 17.4% of the total disbursal (₹6,308 crores) under FAME II to various states.

The state's top industry leaders have also received approvals under the Production Linked Incentive (PLI) scheme for the Automobile and Auto Component Industry, which aims to localise EV manufacturing. Overall, the scheme has attracted a proposed investment of ₹74,850 crores.

## B. Prospective Impacts from the Technological Shift

**The transformation from ICE vehicles to EVs will have impacts across the auto value chain – from the original equipment manufacturers (OEMs) and auto component manufacturers (ACMs) to the service sector. This will have implications for the workforce associated with these businesses, and the districts and clusters where the manufacturing units are concentrated.**

**To precisely understand the prospective impacts on businesses and workers a primary survey was conducted in Pune covering a total of 100 ACMs and 450 workers.**

### 1. Impact on Businesses

#### The EV transition will impact the traditional automobile industry as 45-84% of parts of an ICE vehicle will become obsolete.

The transition from ICE to EV will make about 90-100% of parts of the powertrain of an ICE vehicle obsolete depending on the vehicle type. The non-powertrain parts of ICE vehicles will also be moderately impacted, ranging from 12-37% depending on vehicle type. Besides, there are many similarities in non-powertrain components, and thus, these components of an ICE vehicle can be repurposed for an EV.

Overall, 45-84% of parts of an ICE vehicle will become obsolete. This will impact the manufacturers of such components as they will have to supply fewer parts. There will also be impacts on the spare parts and aftermarket activities resulting from the diminished number of wearable parts in the EV powertrain.

#### The small and micro enterprises constituting 97% of Maharashtra's auto manufacturing segment remain vulnerable to the transition.

There are at least 16,602 units involved in the manufacturing of automobiles and automobile components in various districts in the state. Of these, 26 belong to OEMs and 16,576 to ACMs.

Overall, small and micro enterprises (SMEs) dominate the manufacturing segment constituting 97% of the total units. Among the rest, about 2% are medium enterprises, and 1% are large ACMs and OEMs.

These SMEs remain particularly vulnerable to the transition due to constraints in financial resources, challenges of access to institutional capital, and limited capacity of technology adoption for transitioning to the EV ecosystem.

#### A deep-dive assessment of Pune cluster, the state's and India's largest automobile hub, shows that 25% of the ACMs will be highly or moderately impacted by the transition.

The study of Pune cluster, including a primary survey of enterprises, shows that around 11% of the ACMs will be highly impacted by the transition, and another 14% will be moderately impacted. About one-fourth of the enterprises are in the high and moderately impacted category.

Within the highly impacted category, ACMs involved in subassemblies, such as 'engine, engine exhaust and fuel' and 'transmission' account for nearly 92%. For the moderately impacted category, ACMs involved in such sub-assemblies account for almost 51%.

It is noteworthy that the majority of the enterprises falling under the highly and moderately impacted categories are micro, small and medium enterprises (MSMEs). This highlights the vulnerability of these businesses and the potential challenges they may face during the transition.

### ACMs have started transitioning to EV-related components, but mostly in the same segment.

The enterprise survey also shows that about 45% of ACMs supply EV parts to OEMs. These are primarily SMEs involved in manufacturing non-powertrain parts, such as body, moulding, process-based components, etc.

Therefore, the transition is logical, as these enterprises expand their business by supplying parts of the same sub-assembly for EVs. Only a small share of enterprises (about 7%), primarily medium and large, are doing an opportunistic transition by investing in research and development (R&D) to move to the EV ecosystem.

## 2. Impact on Workforce

### About 3.4 lakh workers are engaged directly by the automobile and auto component manufacturers in Maharashtra.

The OEMs and ACMs collectively employ at least 3,35,237 people in the state formally (including permanent and contractual workers), creating large income dependence. Besides, a significant number of informal workers are associated with the sector, particularly in the MSMEs.

The shift from ICE vehicles to EVs will have implications for a large proportion of the workforce currently engaged in the manufacturing of ICE vehicles, as well as those engaged in the value chain such as servicing and repairs. The digital transformation in the automobile industry will also require a new set of skills from manufacturing to servicing.

**Table 1: Formal employment in the automobile sector in Maharashtra**

| OEM | ACM | | | | Total |
|---|---|---|---|---|---|
| | Large | Micro | Small | Medium | |
| 95,201 | 43,444 | 71,114 | 74,845 | 50,633 | 3,35,237 |

Source: iFOREST analysis based on data from the Department of Industries, individual OEMs, and Survey of industries.

### A major impact will be on contractual and informal workers associated with the ACMs.

The survey of ACMs in Pune cluster shows that the largest share of workers are contractual workers. This includes a sizable proportion of workers who do not have any employer-provided benefits. Besides, there is a significant proportion of informal workers. Overall, contractual, and informal workers constitute more than two-thirds (71%) of the workers in ACMs. The informality is higher in SMEs.

### The impact of the EV transition will affect 31% of the job roles in the ICE ecosystem, particularly related to manufacturing.

About 31% of the job roles in the ICE ecosystem will be affected – 14% will become obsolete and 17% will require reskilling. Maximum job roles will be affected in ICE vehicle manufacturing. Out of the total job roles in this segment, 21.4% would become obsolete.

A workforce survey in the Pune cluster shows that the highest percentage of workers are engaged in manufacturing-related job roles. Overall, 27% of the workforce was found to have machining job roles. The other significant percentage of the workforce are welders (about 11%) and fitters (9%).

### Timely skilling and reskilling interventions can minimise job loss as a majority of the workers in ACMs have decent education and skill levels.

A majority of the workers engaged in the ACMs have secondary or higher secondary-level education. The workforce survey shows that, overall, about 37% of the workers have completed secondary-level education (tenth standard), and 34% higher secondary education. Additionally, 14.4% possess vocational or specialized training. Concerning vocational training, on-the-job learning is prevalent among workers preparing them with the required skills.

Overall, a large proportion of the workforce associated with the ACMs have basic education and skills. Around two-thirds of the auto sector job roles fall between the National Skills Qualification Framework (NSQF) levels 4 and 5. These two levels generally represent jobs such as operators/technicians and managers. People working at NSQF 4 and 5 are skilled and have at least a higher secondary level education. Besides, there are also graduates, including those with technical degrees from polytechnics and Industrial Training Institutes (ITIs).

### The overall impact of the EV transition on jobs will be positive due to the creation of new job roles and EV penetration.

The EV ecosystem while will replace traditional jobs, but will overall create 5% new job roles. Besides, while the number of jobs supported by EVs is slightly lower than ICE vehicles, there will be a net increase in jobs in the automobile sector due to the penetration of EVs. Modeling projections by iFOREST show that the total number of jobs in passenger car manufacturing will grow from 17 lakhs (1.7 million) in 2023-24 to about 33-37 lakhs (3.3=3.7 million) in 2036-37 under various policy scenarios.

## 3. Overall Impact on Districts and Auto Clusters

### About 95% of all automobile enterprises are concentrated in five clusters in the state.

The automobile enterprises are concentrated in five industrial clusters of the state, commonly called the auto clusters. These five clusters - Pune, Mumbai, Aurangabad, Nashik, and Nagpur, have 95% of the enterprises. The agglomeration of enterprises in certain districts/regions, and their subsequent economic dependence makes these regions vulnerable to the EV transition.

### Overall, six districts in Maharashtra remain transition hotspots with Pune topping the chart.

While automobile enterprises are distributed almost across all districts in Maharashtra, about 26% are concentrated in Pune. Overall, six districts collectively account for 65% of the automobile units in the state.

Concerning the number of workers, these districts account for over 83% of the formal workforce engaged in OEMs and ACMs. Besides, there is a vast informal dependence on the automobile sector in all these districts.

The transition from ICE vehicles to EVs will have a concentrated impact on certain districts and auto clusters of the state considering the concentration of enterprises and workforce dependence.

**Table 2: Hotspot districts**

| District | Total no. of OEM units | Total no. of ACM units | Total no. of units (OEMs +ACMs) | Total no. of formal workers |
|---|---|---|---|---|
| Pune | 23 | 4,226 | 4,249 | 180,610 |
| Aurangabad | 2 | 1,648 | 1,650 | 30,631 |
| Kolhapur | | 1,691 | 1,691 | 23,488 |
| Thane | 1 | 1,269 | 1,270 | 14,463 |
| Mumbai suburban | | 1,177 | 1,177 | 13,150 |
| Nashik | | 863 | 863 | 16,738 |
| **Total** | **26** | **10,874** | **10,900** | **279,080** |

Source: iFOREST analysis based on data from the Department of Industries, individual OEMs, and Survey of industries.

## C. Just Transition Roadmap

**Just transition in the automobile sector presents a unique and promising opportunity for Maharashtra, especially when combined with technological innovations, new business avenues, prospects of job creation, and a focus on clean mobility.**

### Just transition of the automobile sector hinges on four key pillars that can aid the progress toward a sustainable, just, and inclusive automobile future.

The just transition vision of the automobile sector should be based on four pillars which are outcome-oriented and designed to guide the development of practical and holistic policies, plans, and investments.

**Pillar 1-Technology and skilling:** Will promote the simultaneous advancement of technology and the development of human resources to ensure the availability of skilled personnel to fully leverage technological capabilities and evolving demands. At the same time, technology needs to be designed and implemented in a manner so that job displacements are reduced and the prospects for new jobs and employability are enhanced.

**Pillar 2- Vibrant green manufacturing:** Will support the green growth agenda and is positioned to make India a hub of green automobile manufacturing.

**Pillar 3- Sustainable mobility choices:** Transition from automobile as a product to mobility as a Service (MaaS) will promote sustainable urban mobility, reduce congestion and pollution, and support a diversification of income opportunities around clean mobility.

**Pillar 4- Green energy and material circularity:** Will reduce the life cycle impact of EVs, from energy and material use, to end-of-life material management.

### Cooperative engagement of various stakeholders at the state and district levels will be necessary to steer the transition.

The states will be at the forefront of developing plans, programmes, and institutional mechanisms to address just transition measures. Considering the state's important role in steering the transition, a comprehensive just transition framework for the automobile sector will be required at the state level covering four components- policies, strategic plans, institutional mechanisms, and a stakeholder engagement plan.

### The State Government will have a crucial role in developing policies, strengthening institutional mechanisms, and mobilising financial resources.

The State Government will have four key roles in supporting a just transition of the automobile sector:

i. Develop a comprehensive, Just Transition Policy Framework for the automobile sector, by instituting necessary reforms in the existing policies related to EVs, industry and MSMEs, and workers, among others, and formulating new policies as required. Supporting provisions in other related state policies, such as renewable energy and urban mobility policies, should be integrated.

ii. Facilitate the development of district or cluster-level transition plans for auto clusters.

iii. Appoint special bodies, such as a State Automobile Sector Just Transition Task Force to inform the State Government and the district authorities/agencies on developing strategies, plans, and designing implementation measures.

iv. Create dedicated funds specifically targeted to support enterprises with limited resources and ACM workers, including informal workers.

### District administration and agencies will have a crucial role in localised planning.

District administration and agencies such as the District Industrial Centers (DIC) will have a vital role in facilitating the development of local plans (such as the district/cluster transition plans) and implementing just transition measures concerning the transition MSMEs.

### The industry bodies can play a vital role in facilitating a just transition given their strong presence and network in auto clusters.

Maharashtra has strong industry bodies and associations that can play a pivotal role. Collaboration between the State Government and these industrial bodies will strengthen just transition planning and the implementation of transition measures.

### Maharashtra should leverage its expertise in engineering and innovation to position itself as a hub for automotive innovation.

With premier institutions in India and being a technology hub, along with a strong capital market, the state is well-positioned to become the hub of automotive innovation and lead in R&D that can make India a global leader. For this, policies, such as the state EV Policy need to be strengthened to support and incentivise the establishment of EV technology R&D centers (centers of excellence) and innovation hubs.

### The transition of MSMEs will be a central issue, given their predominance in auto component manufacturing.

The state Industrial Policy should be strengthened to cover all aspects of MSME enablement for the EV ecosystem. This should include, technology support, access to financing, subsidies and incentives, business/trade promotion, and capacity building. At the same time, the effective implementation of schemes under the MSME Act 2006 will be essential. Measures can also include, developing schemes for short-term collateral-free credit access, and leveraging the network of cooperative banks to take advantage of MSME credit schemes, among others.

### Dedicated funds should be created to specifically support small and micro enterprises, and informal workers, including women.

To support the MSMEs in a targeted manner, particularly SMEs, an MSME transition support fund should be created. This fund can provide transition support to both enterprises and their workers.

A dedicated Skill Development Fund should also be created to particularly support informal workers, women, and other disadvantaged groups to improve the scope of their employability in the EV ecosystem.

### A comprehensive workforce transition policy will be required to support the existing workforce impacted by the transition and prepare a future-ready workforce.

Transition of the existing workforce to the new EV ecosystem to retain jobs, and increasing employability of the future workforce lies at the core of ensuring a just transition of the automobile sector. The government can develop a comprehensive workforce transition policy to address interventions required by the government and enterprises, such as skilling and other transition support, and improvement of foundational skills, among others. Women should be a key focus of workforce transition.

### A Right to Repair and Servicing Policy needs to be instituted to reduce the vulnerability of workers engaged in servicing and repairing.

Servicing and repairing jobs are a crucial part of the automobile ecosystem. This segment also includes a large number of informal workers. To reduce the vulnerability of workers in the servicing and repairing segment a 'Right to Repair and Servicing' policy can be effective. The policy should enable EV manufacturers to involve local service centers in repairing and servicing and retain employment.

### A Workforce Transition Plan by OEMs should be mandated for strengthening enterprise-level action.

Mandating the development of a Workforce Transition Plan by the OEMs will be an effective policy instrument for workforce transition at the enterprise level, and complement government policies and transition measures. The plan for workforce transition should be output-oriented, outlining key performance indicators (KPIs) for monitoring its implementation.

### An output and outcome-oriented Cluster Transition Plan should be developed to support targeted transition measures for each automobile cluster.

Considering the concentration of ACMs in various clusters and the unique challenges and opportunities of each cluster (given the ACMs' business portfolio, workforce dependence, local industrial activities, business environment, etc.), the development of transition plans for each cluster will be necessary. The plan should include:

i. Detailed information related to the cluster, including enterprises and workers;

ii. Assessment of strengths, weaknesses, opportunities, and threats of the cluster;

iii. A five-year transition strategy and plan, including key intervention areas; and,

iv. Financial requirements.

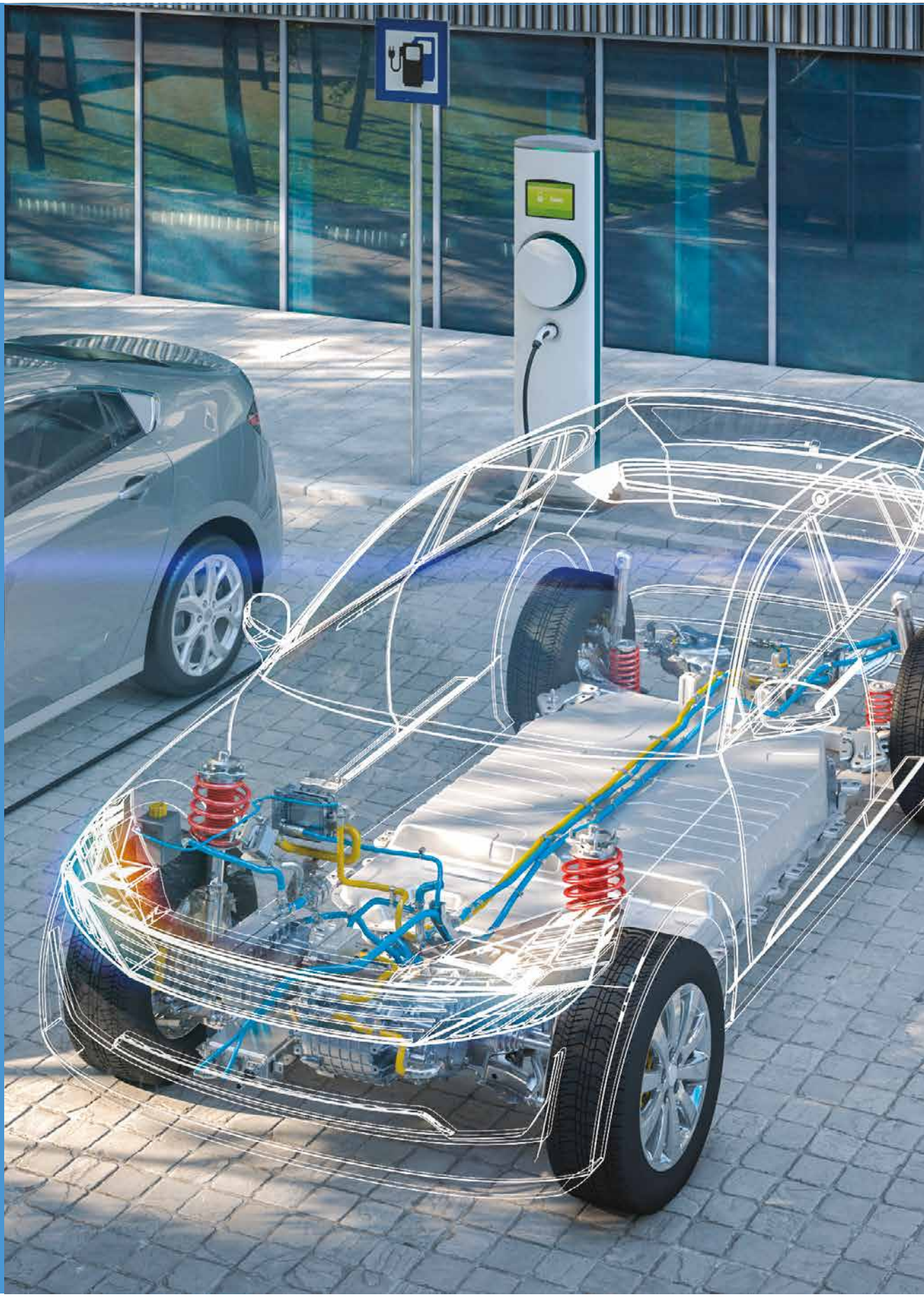
### Increasing cleaner public transport systems and shifting from vehicle ownership to Mobility as a Service (MaaS) will ensure a sustainable urban environment.

The EV transition should be balanced by considering the sustainability of our urban spaces. While EVs play a crucial role in decarbonising transportation, relying heavily on individual EV ownership will pose challenges to urban livability. Clean public transport systems, such as e-buses, along with last-mile connectivity services must be scaled up, by integrating mobility planning with urban planning.

Simultaneously, promoting MaaS can bring considerable environmental and societal benefits, such as lowering individual carbon footprints, reducing congestion, and boosting service sector employment opportunities in the clean mobility ecosystem.

### Transition to EVs should consider a lifecycle approach to lower overall environmental impacts.

Achieving environmental sustainability in the EV transition requires a holistic approach that considers the entire lifecycle of EVs and addresses energy and material use at every stage. Using renewable-based energy will be essential to minimise the carbon footprint of EVs. Similarly, sustainable mining practices for extracting raw materials for battery manufacturing, battery recycling, and research into alternative battery chemistries with fewer rare or toxic materials will be essential for reducing material extraction and use and overall environmental impacts.



# 01

# EV Transition to Just Transition

# 1.1 Context

India is the world's fourth-largest vehicle manufacturer and produced over 259 lakh (25.93 million) vehicles in 2022-23.[1] In 2022-23, India also became the third-largest automobile market in terms of vehicles sold.[2] The automobile industry thus contributes significantly to India's Gross Domestic Product (GDP), accounting for 7.5% of the national GDP and a massive 49% of the manufacturing sector's GDP.[3] The automobile sector is estimated to employ about three crore (30.7 million) people considering direct (13.7%) and indirect employment (86.3%)[4].

Maharashtra holds the most significant position in India's automobile landscape as the state has the largest automobile industry. The state accounts for approximately 20% of vehicles manufactured in the country. Besides, it has about 21% production share of automobile parts and accessories and 24% of other transport equipment.[5]

The automobile sector's strength in Maharashtra is reflected in its economic contributions. The sector contributes about 7% to the Gross State Domestic Product (GSDP), the highest among all manufacturing sectors in the state. Additionally, it contributes significantly to the Industrial GSDP, accounting for around 15.3%.[6]

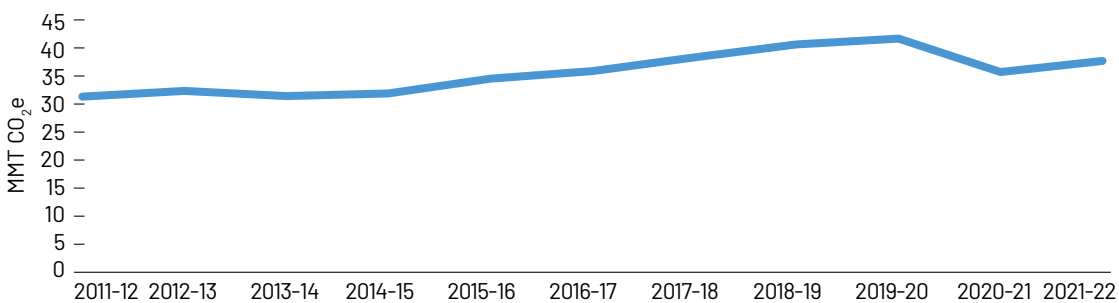
While a key economic sector, the automobile sector also remains crucial for a green industrial transition of the state and for strengthening climate mitigation action. Traditional vehicles powered by internal combustion engines (ICE) and using fuel sources such as gasoline and diesel, remain key contributors to carbon dioxide (CO2). In India, road transport accounts for about 12% of the total energy-related CO2 emissions and is a key contributor to urban air pollution.[7]

In Maharashtra, the road transport sector is the second-largest CO2-emitting sector (after thermal power), accounting for 12.2% of the total emissions in 2021-22 (see box: Emissions from the road transport sector). With the growth in personal vehicle ownership and overall vehicular demand, the situation is likely to worsen in the coming years under business-as-usual. Therefore, to reduce industrial greenhouse gas (GHG) emissions and ensure green growth, a transition of the automobile sector becomes essential.

## BOX: EMISSIONS FROM THE ROAD TRANSPORT SECTOR

With 37.7 MMT $CO_2e$ emissions, the road transport sector is the second largest $CO_2$ emitting sector in Maharashtra (after thermal power), accounting for 12.2% of the total emissions in 2021-22. Overall emissions have increased moderately in the last 10 years, with emissions still being below the pre-COVID period peak seen in 2019-20.

**Figure 1.1: Emissions from road transport (MMT$CO_2e$)**




Source: iFOREST analysis

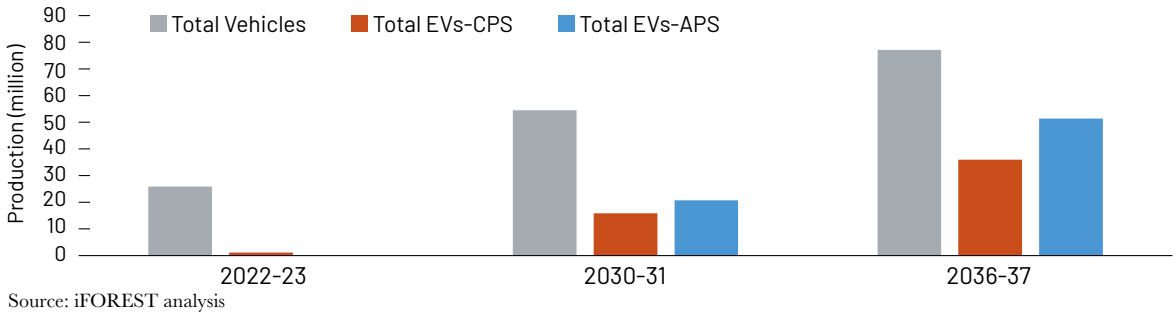
To reduce GHG emissions from this sector, the transition of road transport from being built on fossil-fuel-based Internal Combustion Vehicles to EVs will be crucial. Modelling studies indicate a high potential for avoided emissions from the use of EVs in Maharashtra.[14] For example, in the year 2023, the sale of 1.6 lakh (0.16 million) two-wheelers in Maharashtra translated to about 0.1 MMT of $CO_2$ emission avoidance. Overall, in 2023, the sales of EVs across vehicle segments translated to a $CO_2$ emission avoidance of 0.16 MMT.

# 1.2 The EV transition

A key aspect of the green transition of the automobile is the electrification of the vehicular fleet. Supported by technological innovations, government policies, and private investments, the momentum of electrification of the vehicular fleet has already set in. In India, according to estimates of the latest Economic Survey, the domestic electric vehicle (EV) market is expected to grow at a compound annual growth rate (CAGR) of 49% between 2022 and 2030.[8] By 2030, the annual sales of EVs are expected to reach about one crore (10 million) units,[9] from about 13.8 lakhs (1.38 million) presently[10]– a nearly seven-fold increase.

Simultaneously, the production of EVs in India will also scale up massively. Estimates by a modeling study by iFOREST considering various policy scenarios show that while India's total vehicle production is expected to double by 2030-31 compared to present levels (about 2.6 crore or 25.9 million units in 2022-23), EV production will experience a more rapid acceleration. With an anticipated annual growth rate of 38-42% from 2022 to 2030 under various policy scenarios, EV production is expected to range between 1.5 to 2.1 crore (15.9 to 20.8 million) units by 2030-31.[11]

**Figure 1.2: Growth projections for total vehicle versus EV production**




Source: iFOREST analysis

By 2030-31, EVs will dominate the two-wheeler (2W) and three-wheeler (3W) segments. For the 2Ws, adoption rates are forecasted to range from 30-40% by 2030-31 and between 50-70% by 2036-37. For 3Ws, the market share is projected to increase to 90% by 2030-31 and approach nearly 100% by 2036-37. On the other hand, the penetration of EVs in the passenger car segment is predicted to be more gradual. Starting from a base of 1.2% in 2022-23, the share of EVs in this segment is expected to rise to 15-20% by 2030-31, and further to 25-50% by 2036-37, depending on various scenarios.[12]

## MODELLING SCENARIOS

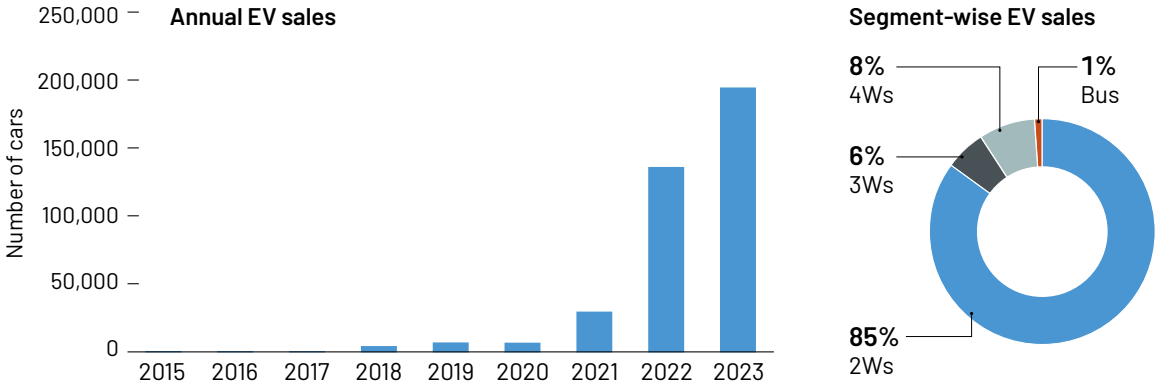
**1). For all vehicles,** multiple scenarios were modelled, including linear extrapolation (excluding the COVID years), GDP elasticity, income elasticity and CAGR, to arrive at the best fit for each vehicle segment.

**2). For EVs, two scenarios were modelled:**

- **Current Policy Scenario (CPS):** The CPS is based on existing government policies and has been developed considering that the policies are implemented as per their intent (and not the informal targets). The implementation of FAME and the PLI scheme has been able to help achieve an indigenisation level of 90% in all segments of EVs. Simultaneously charging and battery swapping infrastructure are created. The total cost of ownership (TCO) of ICE vehicles and EVs will reach parity by 2025. Overall, during the projection period (2023-2036), the average GDP growth rate is 6.5%.
- **Aspirational Policy Scenario (APS):** The APS is based on more ambitious government policies to accelerate the EV transition. It assumes that FAME III is implemented for EV adoption which will further incentivise domestic manufacturing. Further policies are introduced and implemented to restrict the entry/movement of ICE vehicles in certain parts of the city to control air pollution. The TCO of EVs will be 10-25% less than ICE vehicles by 2030 for various segments. Overall, during the projection period (2023-2036), the GDP grows at a higher rate of 8%.

Maharashtra has already emerged as a front-runner in India's EV transition. The penetration of EVs has increased drastically in the past three years, from just 0.4% share of all vehicle sales in 2020 to 7.6% by 2023.[13] In 2023, the state recorded the highest sales of EV cars and 2Ws in the country. Overall, the state had the second-highest share of total EV sales, which is about 12.6% of India's total.[14]

**Figure 1.3: EV sales in Maharashtra**




Source: E-Vahan Dashboard January 2024

However, the transition from ICE vehicles to EVs will create disruptions in the traditional automobile sector in the state. This is because an EV is different from an ICE vehicle. The fundamental difference between an ICE vehicle and an EV is in the powertrain – a group of components that generate power and deliver it to the wheels. About 90-100% of parts of the powertrain of an ICE vehicle will become obsolete due to the transition to EVs, depending on the vehicle type.

The non-powertrain parts of ICE vehicles will also be moderately impacted. The obsolescence of parts in an ICE 2W will be 28%, 3W will be 37%, and in cars will be 12%. Besides, there are many similarities in non-powertrain components, and thus, these components of an ICE vehicle can be repurposed for an EV. Overall, 45-84% of parts of an ICE vehicle will become obsolete. The obsolescence in the case of an ICE 3W will be as high as 84%, whereas it will be 45% in the case of passenger cars.

The lower requirement of powertrain parts in an EV will impact the business of auto component manufacturers (ACMs) as they will have to supply fewer moveable and wearable parts. There will also be impacts on the spare parts and aftermarket activities resulting from the diminished number of wearable parts in the EV powertrain compared to an ICE powertrain.

## 1.3 Considerations for a just transition

The transition from ICE vehicles to EVs marks a paradigm shift in mobility and transportation. However, the transition has potential implications for businesses, the workforce, and the environment. The momentous transformation in technology will have impacts across the value chain of the automobile industry– from the original equipment manufacturers (OEMs) and ACMs to the workforce and the service sector. This disruption will drive significant changes in business models, research and development (R&D), and job markets. At the same time, a high adoption of EVs, without simultaneous attention to improving green and efficient public transport systems can compromise the urban environment and choke towns and cities.

To mitigate these potential downsides, a sustainable and just transition of the automobile sector is essential. The transition to EVs, therefore, requires a holistic outlook and necessitates the development of a comprehensive policy framework that will not only foster an EV transition but will ensure a green transformation of the mobility ecosystem.

## JOBS SCENARIO IN THE EV ECOSYSTEM

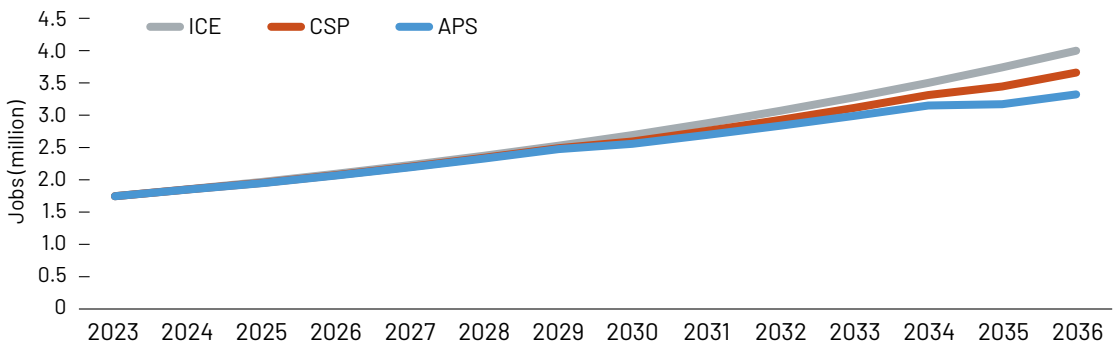
The transition from ICE vehicles to EVs will have a significant impact on traditional job roles in the auto sector, involving various workers. Analysis shows that 31% of the job roles will be affected, out of which 14% will become obsolete. Maximum job roles will be affected in the manufacturing segment.

However, the EV ecosystem will create new opportunities and the overall impact on jobs will be positive. This is because of two reasons. Firstly, 5% of new job roles will be created in the EV ecosystem, as compared to those impacted. Secondly, while the number of jobs supported by EVs is slightly lower than ICE vehicles, there will be a net increase in jobs in the automobile sector due to the penetration of EVs.

A modelling study of iFOREST undertaken on jobs for the passenger car segment shows the potential. In the study, the number of jobs was estimated for both the CPS and APS till 2036-37. The two scenarios were compared with a scenario in which it was assumed that only ICE cars were produced (ICE Scenario).

The results show that the total number of jobs in passenger car manufacturing is projected to grow from 17 lakhs (1.7 million) in 2023-24 to 26 lakhs (2.6 million) in 2030-31, and about 33-37 lakhs (3.3=3.7 million) in 2036-37. So, there is no job loss per se due to the transition from ICE vehicles to EVs. However, the number of jobs created in the CPS and APS scenarios is lower than those in the ICE scenario. In 2036-37, 8–17% fewer jobs would be created than in the ICE scenario. Thus, the number of jobs supported by EVs is relatively lesser than ICE.

**Figure 1:4: Impact on jobs in various scenarios**




Source: iFOREST analysis

This report evaluates the transition impacts from ICE vehicle to EV in Maharashtra with a deep-dive study of the Pune automobile cluster. The study assesses the impacts of the transition on the enterprises and the workforce. Based on the assessment of impacts and evaluation of the existing policy landscape, the report outlines a comprehensive framework and a policy roadmap for just transition of the automobile sector in the state.

The study and the proposed framework and roadmap are intended to inform policymakers, industry leaders, and other stakeholders to navigate the complexities of the EV transition while prioritising social equity, economic resilience, and environmental sustainability. Considering Maharashtra's centrality in India's automobile landscape, the observations of the report can also serve as a valuable template for various other states and automobile clusters, and provide guidance for developing effective transition strategies, policies, and plans.

02

# Automobile Landscape of Maharashtra

## 2.1 Enterprises

Maharashtra has 16,602 enterprises involved in the manufacturing of automobiles and automobile components. This includes 26 original equipment manufacturers (OEMs) and 16,576 auto component manufacturers (ACMs). Of the ACMs, about 79.5% are micro-enterprises and 17.8% are small enterprises. Overall, 97% of all automobile enterprises in Maharashtra are small and micro-scale[1].

**Table 2.1: Number of automobile enterprises**

| Type of enterprise | No. of units |
|---|---|
| OEMs | 26 |
| ACMs | 16,576 |
| ACMs – Large | 100 |
| ACMs – Medium | 352 |
| ACMs - Smal | 2,950 |
| ACMs - Micro | 13,174 |
| **Total** | **16,602** |

Source: iFOREST based on data from Directorate on Industries, Government of Maharashtra, 2023.

## 2.2 Spatial distribution

There are seven industrial clusters in Maharashtra where various auto enterprises are located. However, 95% of all enterprises are concentrated in five clusters -- Pune, Mumbai, Aurangabad, Nashik, and Nagpur.[2]

The Pune cluster is the largest automobile manufacturing hub in the state and one of the largest in India. Over 41% of all enterprises are concentrated in this cluster, including 23 of the 26 OEMs.

**Table 2.2: Distribution of OEMs and ACMs across various clusters**

| Type of enterprise | Pune | Mumbai | Aurangabad | Nasik | Nagpur | Amravati | Thane | Total |
|---|---|---|---|---|---|---|---|---|
| OEMs | 23 (88%) | 0 | 2 (8%) | 0 | 0 | 0 | 1 (4%) | 26 |
| ACMs – Large | 61 (61%) | 23 (23%) | 7 (7%) | 8 (8%) | 1 (1%) | 0 | 0 | 100 |
| ACMs – Medium | 213 (61%) | 51 (14%) | 50 (14%) | 26 (7%) | 9 (3%) | 1 (0.3%) | 2 (0.6%) | 352 |
| ACMs - Small | 1,606 (54%) | 412 (14%) | 439 (15%) | 299 (10%) | 83 (3%) | 19 (1%) | 92 (3%) | 2,950 |
| ACMs - Micro | 4,974 (38%) | 3,412 (26%) | 1,777 (13% | 1,439 (11%) | 755 (6%) | 337 (3%) | 480 (4%) | 13,174 |
| **Total** | **6,877 (41%)** | **3,898 (23%)** | **2,275 (14%)** | **1,772 (11%)** | **848 (5%)** | **357 (2%)** | **575 (3%)** | **16,602** |

Source: iFOREST based on data from Directorate on Industries, Government of Maharashtra, 2023

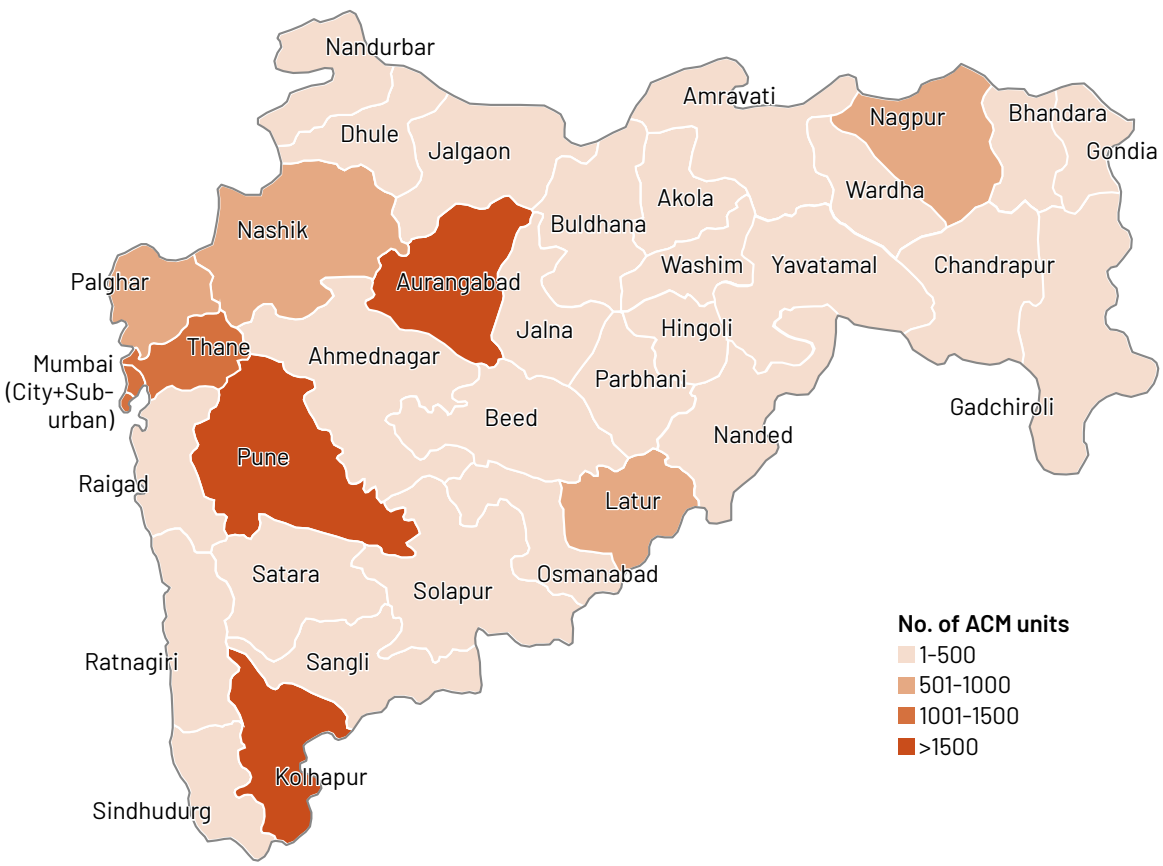
A district-wise distribution of automobile enterprises shows that 37 districts in Maharashtra have automobile-related enterprises. Of these, about 26% are concentrated in Pune district. Overall, the top districts with the largest concentration of enterprises include Pune, Kolhapur, Aurangabad, Thane, Mumbai Suburban, and Nashik. These districts collectively account for 65% of the automobile enterprises.

**Table 2.3: Top districts with automobile enterprises**

| District | No. of enterprises | | | | | |
|---|---|---|---|---|---|---|
| | OEM | ACM - Large | ACM-Micro | ACM-Small | ACM-Medium | Total |
| Pune | 23 | 56 | 2,977 | 1,039 | 154 | 4,249 |
| Aurangabad | 2 | 7 | 1,174 | 418 | 49 | 1,650 |
| Kolhapur | | 2 | 1,147 | 496 | 46 | 1,691 |
| Thane | 1 | 3 | 1,102 | 154 | 10 | 1,270 |
| Mumbai suburban | | 3 | 1,041 | 113 | 20 | 1,177 |
| Nashik | | 6 | 628 | 205 | 24 | 863 |
| **Total** | **26** | **77** | **8,069** | **2,425** | **303** | **10,900** |

Source: iFOREST based on data from Directorate on Industries, Government of Maharashtra, 2023

**Map 2.1: District-wise distribution of automobile units**




Source: iFOREST analysis of data from Directorate on Industries, Government of Maharashtra, 2023

## 2.3 Employment

Considering the large number of OEMs and ACMs in the state, employment dependence on the automobile sector is very significant. The employment data has been estimated based on multiple sources, including the Department of Industries, individual OEMs, and a survey of industries.

**Table 2.4: Formal employment in the automobile sector**

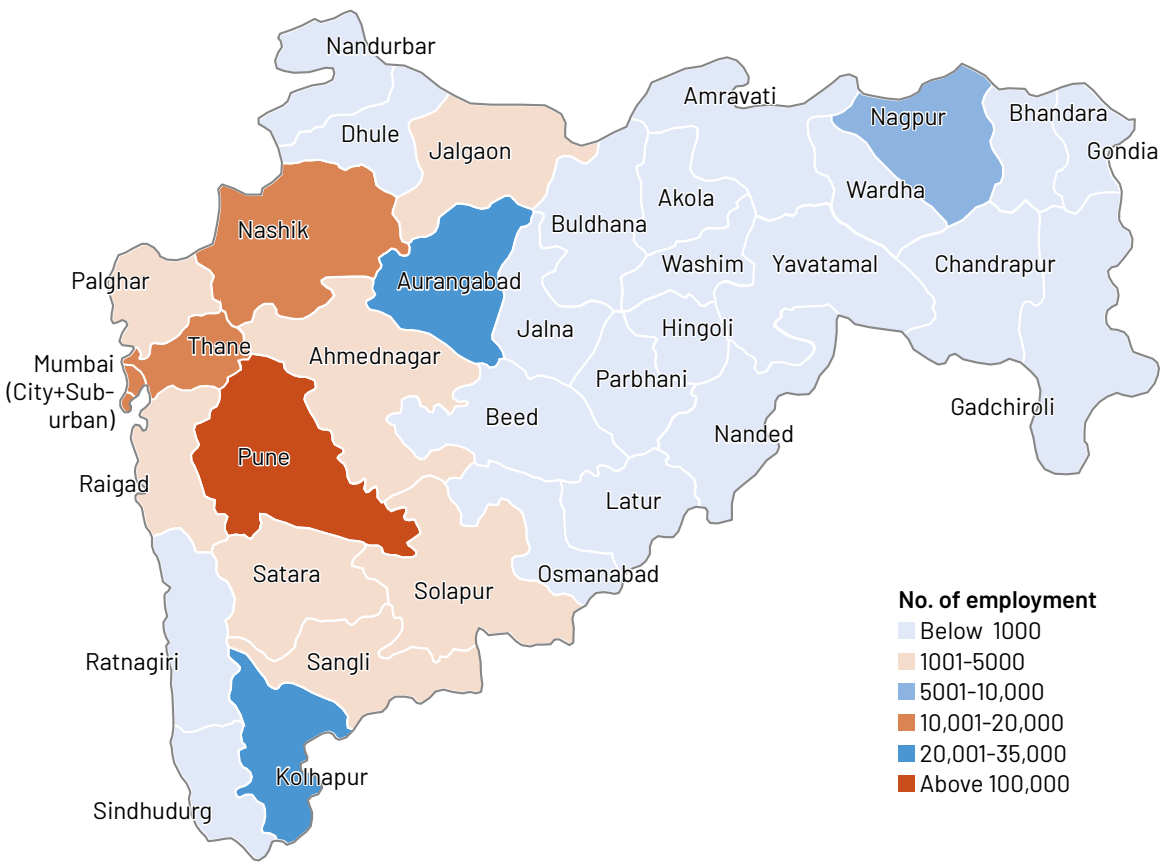
| | OEM | ACM | | | | Total |
|---|---|---|---|---|---|---|
| | | Large | Micro | Small | Medium | |
| Maharashtra | 95,201 | 43,444 | 71,114 | 74,845 | 50,633 | 3,35,237 |

Source: iFOREST analysis based on data from the Department of Industries, individual OEMs, and Survey of industries.

As per the information, the automobile sector provides direct employment to at least 3.4 lakh people in the state. These are formal employees who are either directly employed by companies or employed through contractors. However, a survey by iFOREST in Pune indicates that there are a significant number of informal workers associated with the sector, particularly in the MSMEs, who are not counted in the employment statistics (refer to Chapter 3).

Overall, ACMs account for 72% of formal employment, while OEMs provide about 28% of formal jobs. MSMEs account for close to 60% of all formal jobs. In terms of geographical spread, 54% of all automobile jobs (over 180,000) are in Pune. This is followed by Kolhapur with 7% and Mumbai with 5.8% of total jobs. The top 5 districts account for 81% of the total formal jobs in the auto sector.

**Map 2.2: District-wise distribution of formal workforce**




Source: iFOREST based on data from various sources. ACM's employment data was obtained from the Department of Industries, Government of Maharashtra, 2023; OEM's employment number was obtained from the Department of Industries and company-specific information.

## 2.4 Transition hotspots

Overall, the analysis of the automobile landscape shows that a transition from ICE vehicles to EVs will impact various districts and auto clusters of the state differentially considering the concentration of enterprises and workforce dependence. However, there are certain districts where the impact will be most pronounced.

The districts that remain the hotspots of automobile transition considering the number (therefore the concentration) of enterprises and workforce are Pune, Aurangabad, Kolhapur, Thane, Mumbai Suburban, and Nashik. Among them, the first five have over 1,000 enterprises. Most of them are small and micro enterprises (SMEs).

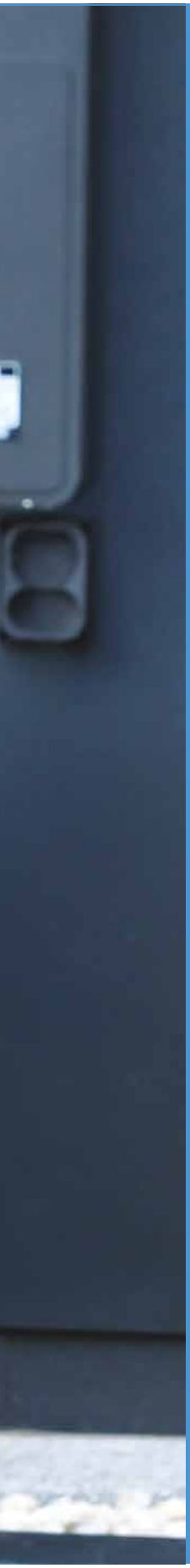
Concerning the number of workers, these six districts collectively account for over 83% of the formal workforce engaged in OEMs and ACMs in the state. Besides, as noted earlier, there is a large number of informal dependence on the automobile sector in all these districts.

**Table 2.5: Hotspot districts**

| District | Total no. of OEMs | Total no. of ACMs | Total no. of enterprises | Total no. of formal workers |
|---|---|---|---|---|
| Pune | 23 | 4,226 | 4,249 | 180,610 |
| Aurangabad | 2 | 1,648 | 1,650 | 30,631 |
| Kolhapur | | 1,691 | 1,691 | 23,488 |
| Thane | 1 | 1,269 | 1,270 | 14,463 |
| Mumbai suburban | | 1,177 | 1,177 | 13,150 |
| Nashik | | 863 | 863 | 16,738 |
| **Total** | **26** | **10,874** | **10,900** | **279,080** |

Source: iFOREST analysis based on data from the Department of Industries, individual OEMs, and Survey of industries.

To minimise the impacts of the transition from ICE vehicles to EVs in these districts and overall in automobile clusters within the state, developing timely intervention measures will be necessary. This will require a thorough assessment of each automobile cluster to inform effective policies and plans.



# 03

# Impact Evaluation of the EV Transition: Study of the Pune Auto Cluster

# 3.1. Introduction

Automobile production in India is concentrated in certain regions due to a favorable business environment, access to markets, good infrastructure, and the availability of the required labour force. The regions, commonly referred to as the auto clusters, are located in various parts of the country. The clusters are typically characterised by a large concentration of micro, small and medium enterprises (MSMEs). These enterprises represent a major share of the auto manufacturing units and have a large-scale employment dependence.

Among the various automobile clusters in India, the Pune cluster[1] is known to be the largest automobile hub.[2] The growth of businesses in the cluster has been driven by major industry players, including domestic companies such as TATA Motors, Bajaj, and Mahindra and Mahindra, and international companies such as Mercedes-Benz, Ford, Skoda, Renault-Mahindra, Fiat-TATA, and Audi.

The Pune cluster has a diverse auto/engineering supply chain, including OEMs, ACMs of various tiers producing various components, and numerous facilities for diverse processes such as casting, forging, sheet metal work, welding, machining, plastic moulding, tooling, assembly, and testing. Encompassing all major segments of the auto industry, such as engine parts, transmission, suspension, electrical, and chassis components, the cluster comprises a mix of public, private, proprietary, and partnership enterprises.[3]

Overall, there are over 6,854 ACMs in the cluster. Besides, there are 23 OEMs. The cluster is dominated by SMEs constituting about 97% of the enterprises.[4] These enterprises are highly concentrated in Pimpri-Chinchwad, Chakan, Bhosari, Talegaon and Chikhali areas.[5]

**Table 3.1: Distribution of ACMs in Pune cluster**

| Type of enterprises | Number |
|---|---|
| Large | 61 |
| Medium | 213 |
| Small | 1,606 |
| Micro | 4,974 |
| **Total** | **6.854** |

Source: iFOREST analysis based on data from Industry Department, Government of Maharashtra, and District Industry Centre, Pune, 2023.
Note: Pune auto cluster represents enterprises in the Pune industrial region, which includes enterprises in Pune district and others in the vicinity.

There are a large number of workers who are dependent on these enterprises. There are about 123,759 workers who are directly engaged by the ACMs. Besides, over 88,000 workers are employed by the OEMs.

About 56% of the ACM workers are engaged with small and microenterprises. Besides, 3.1% are engaged in medium enterprises and 0.8% in large enterprises.

# 3.2. Evaluation approach

The evaluation of impacts due to the transition from ICE vehicles to EVs has been captured considering three specific aspects:

a. The impact on enterprises operating in the clusters, primarily ACMs;
b. The impact on the workforce; and,
c. Transition preparedness of enterprises to the EV ecosystem.

**a. Assessment of impact on enterprises:** The impact on ACMs is based on a detailed analysis of sub-assemblies (20 sub-assemblies) and vehicle segments they are involved in. The information on sub-assemblies has been procured from the public domain. Based on the impact level, an overall impact score has been given to the enterprises on a scale of 0 to 1. Enterprises with an impact score greater than 0.6 have

been considered highly impacted, those with a score between 0.3 and less than 0.6 have been considered moderately impacted, while those with a score less than 0.3 are considered least impacted.

Overall, to obtain a more comprehensive understanding of how ACMs in the cluster might be impacted, a detailed analysis of sub-assemblies of 1,128 enterprises was undertaken based on the completeness of information as available in the public domain.

## IMPACT ASSESSMENT APPROACH FOR ENTERPRISES

The ACMs are engaged in manufacturing a wide array of parts, including powertrain and non-powertrain parts used in a vehicle. In the event of an EV transition many of these parts will be impacted in various ways, which will also have an impact on the businesses of the ACMs.

To evaluate the impact of the EV transition on ACMs the following steps have been followed:

1. Categorisation of two-wheeler (2W), three-wheeler(3W), and car parts into 20 distinct powertrain and non-powertrain sub-assemblies.

2. Assigning impact scores to each sub-assembly, based on the impacts on each part in a sub-assembly:

- Impacted (parts that will become obsolete): 1
- Non-impacted (ICE parts that are identical to EV parts): 0
- Repurposed (parts that can be used in EVs with some modification): 0.5

***Impact score of sub-assembly = 1 * (% Impacted parts) + 0.5 * (% Repurposed parts) + 0 * (% Non-Impacted parts) / (100)***

3. Mapping enterprises and analysing their business portfolios to identify parts produced by them and categorising them under 20 subassemblies. One enterprise can be involved in making products under multiple sub-assemblies and multiple vehicle categories (2W, 3W, car, and commercial vehicle).

4. Assigning scores to an enterprise based on the sub-assemblies and vehicle segment they are involved in.

***Impact score of enterprise = ∑ Impact Score of sub-assembly for (2W + 3W +car +commercial vehicle) / Δ***

Where ∑ is the summation of values, and Δ is equal to:

- 1 if the enterprise serves a vehicle segment
- 2 if the enterprise serves two vehicle segments
- 3 if the enterprise serves three vehicle segments
- 4 if the enterprise serves all vehicle segments

The impact score of enterprises is given on a scale of 0 to 1. Enterprises with an impact score greater than 0.6 have been considered highly impacted, those with a score between 0.3 and less than 0.6 have been considered moderately impacted, while those with a score less than 0.3 are considered to be least impacted.

**b. Assessment of impact on workforce:** The assessment of potential impact on the workforce associated with various enterprises is based on a primary survey conducted in the cluster, covering a total of 100 ACMs and 450 workers. The sample was determined through a 'purposive sampling' approach considering the scope and objective of the study, which is to precisely understand the impact of the transition on businesses and the workforce and any strategies that these businesses are adopting in response to the demands of the EV ecosystem.

**c. Assessment of transition preparedness of enterprises:** An assessment has also been undertaken to understand the transition and diversification strategies adopted or planned by the ACMs in response to the changing demands of the EV sector. This is based on the primary survey responses of 100 enterprises from the cluster.

The results of the impact assessment and the transition strategy being adopted or planned by the ACMs are outlined in the following sections.

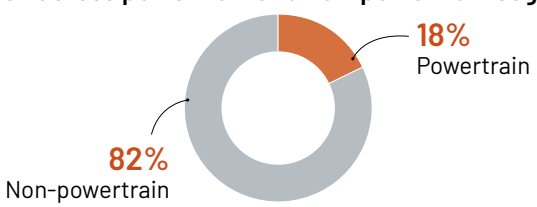
## 3.3 Assessment of impact on enterprises

Assessing the impact of the EV transition on enterprises requires understanding of the profile of ACMs considering the sub-assemblies they are engaged in. The overall profile of enterprises in the Pune cluster has been determined based on a detailed analysis of sub-assemblies of 1,128 enterprises, as per the completeness of information in the public domain. These enterprises are primarily engaged in the manufacturing of various powertrain and non-powertrain parts.

### 3.3.1 Enterprise profile

As mentioned earlier, the auto component manufacturing segment in the Pune cluster is dominated by MSMEs, primarily small and micro enterprises. An assessment of the subassemblies of various types of ACMs shows that about 18% of the ACMs are involved in the production of powertrain parts. The remaining 82% are primarily engaged in manufacturing non-powertrain parts.

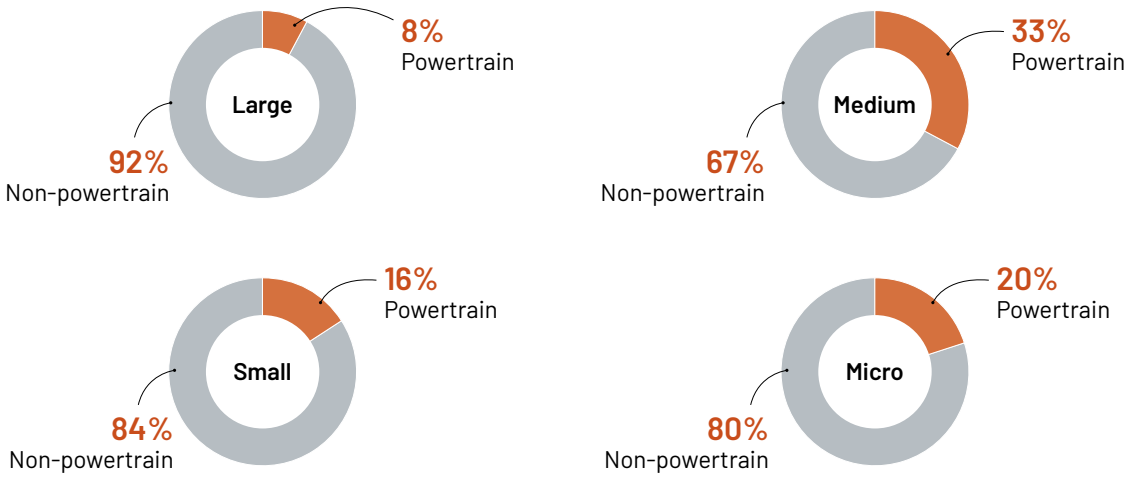
**Figure 3.1: ACM distribution across powertrain and non-powertrain segments**




Source: iFOREST analysis

Concerning the size of ACMs engaged in these sub-assemblies, the medium enterprises are primarily engaged in powertrain parts. The small and micro enterprises are largely engaged in non-powertrain sub-assemblies.

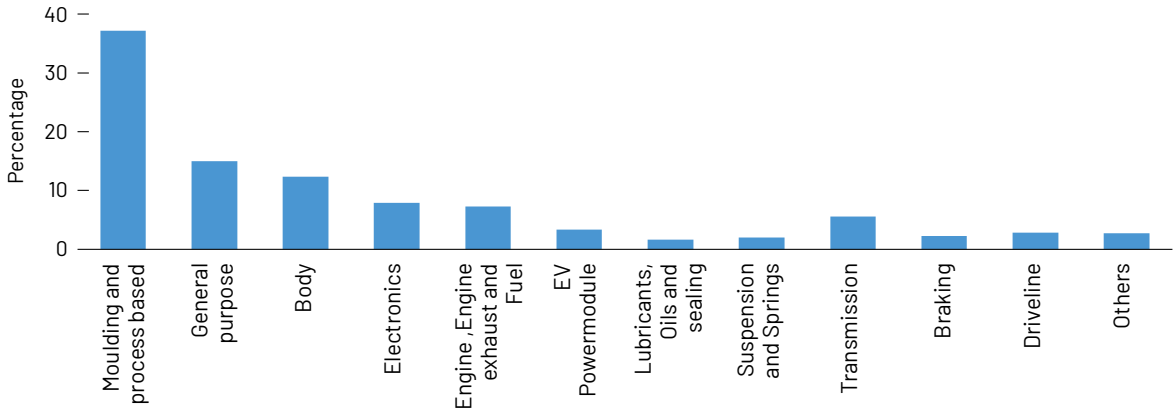
**Figure 3.2: ACM types and engagement in powertrain and non-powertrain subassemblies**




Source: iFOREST analysis

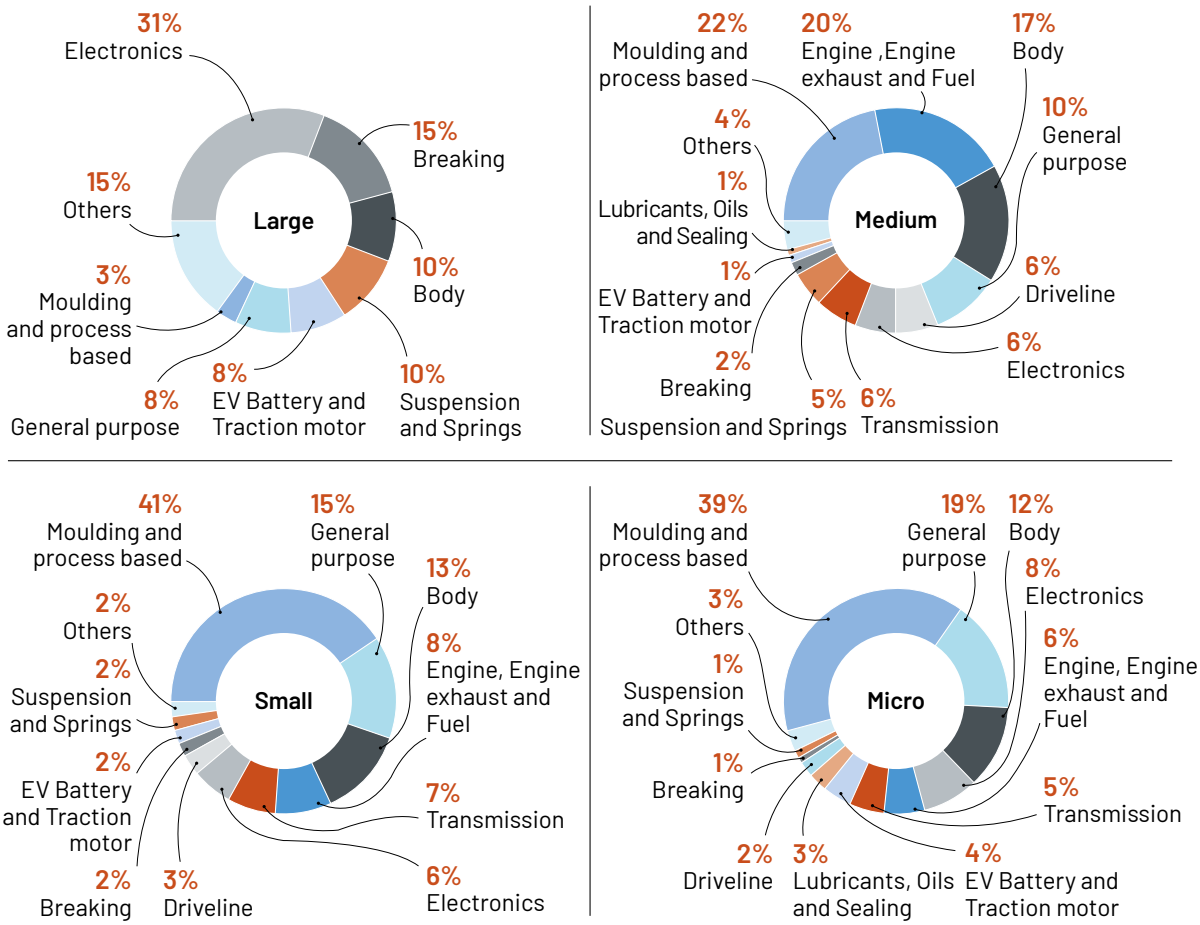
Among the ACMs that are engaged in non-powertrain subassemblies, overall, more than 52% are involved in 'moulding and process-based activities' and 'general purpose' sub-assemblies that will not be impacted by the EV transition.

**Figure 3.3: Overall distribution of ACMs across powertrain and non-powertrain segments**




Source: iFOREST analysis
Note: (a) Others include accelerator, air conditioning, wheel, steering, software & applications, lubricants, and oil. (b) EV power modules include EV battery, EV electrical and electronics, and traction motor. Over 67% of all auto enterprises in the Pune auto cluster focus on moulding and process-based, general components and body assembly. (b) Transmission includes only clutch and gear parts; Driveline includes shaft, axle and differentials.

**Figure 3.4: ACM types and engagement in various sub-assemblies**




Source: iFOREST analysis

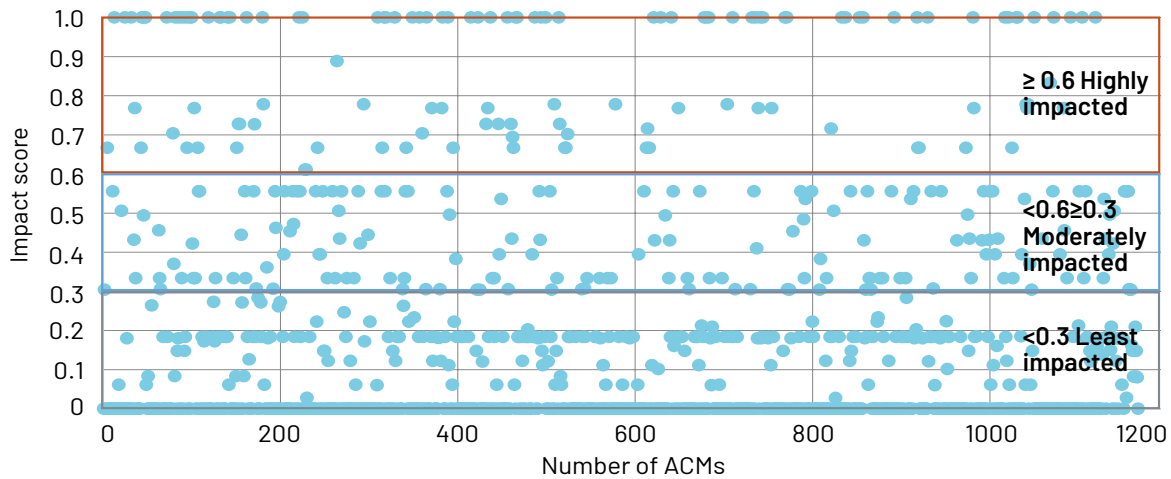
## 3.3.2 Impact assessment

The impact on ACMs and overall the cluster, as discussed earlier, has been assessed by deriving an impact score based on the product. The analysis shows that around 11% of the ACMs will be highly impacted by the transition, and another 14% will be moderately impacted. Overall, about one-fourth of the enterprises are in the high and moderately impacted category.

Within the highly impacted category, ACMs involved in subassemblies, such as 'engine, engine exhaust and fuel' and 'transmission' account for nearly 92%. For the moderately impacted category, ACMs involved in such sub-assemblies account for about 51%. Overall, most of the enterprises falling under the highly and moderately impacted categories are MSMEs.

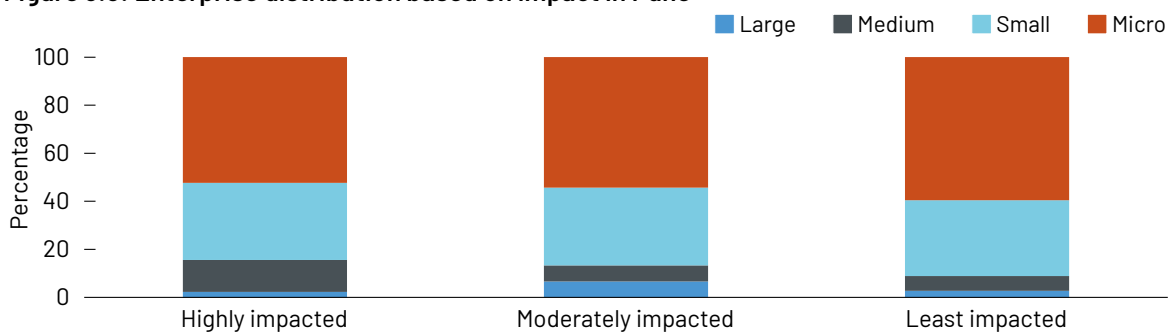
The rest of the enterprises, which is about 75% of the total ACMs analysed, since they are primarily engaged in non-powertrain sub-assemblies will not face significant impact, due to their engagement in non-powertrain subassemblies, particularly in mounding and process-based activities, general purpose, and body. These enterprises also have a comparatively diverse product portfolio.

**Figure 3.5: Impact assessment of ACMs in the Pune cluster**




Source: iFOREST analysis

**Figure 3.6: Enterprise distribution based on impact in Pune**




Source: iFOREST analysis

Overall, the evaluation of the potential impact on enterprises in the cluster considering their specific characteristics suggests that despite a smaller percentage of enterprises in Pune being highly or moderately impacted by the transition, the main challenge is that they are largely MSMEs. These enterprises are highly vulnerable and at a disadvantage due to limited financial and technological resources.

Therefore, a crucial aspect of mitigating the impact in the Pune cluster will be developing strategies and policies for supporting MSMEs. This can involve measures, such as targeted technological assistance and training programmes developed in collaboration with larger ACMs or OEMs, and financial support for diversifying their businesses and for investments in manufacturing parts aligned to the EV ecosystem.

### PERSPECTIVE OF ACMs ON TRANSITION IMPACT

During the survey a number of enterprises shared qualitative insights into the challenges they are either facing or are likely to face while transitioning from ICE to EVs.

Several enterprises pointed out that the rapidly evolving EV value chain has led to many fluctuations in the market. The need for a robust network and new distributors reflects the evolving supply chain dynamics specific to the electric vehicle domain. A notable theme is the difficulty in sourcing raw materials for EVs batteries, specifically for storage and processing suggesting unique challenges associated with the critical components of electric vehicles. Issues related to the localization of actual materials, ill-defined raw material supply chains, and sustainability and storage concerns highlight the infancy of the EV material supply ecosystem, necessitating clearer frameworks and standards.

Financial challenges, such as insufficient working capital and difficulties in raising additional finance, were noted by a few Micro enterprises. This highlights the importance of financial support mechanisms for enterprises transitioning to EV production.

The managing director of a medium sized enterprise in Chakan noted that "If we want to manufacture batteries from scratch then raw material market is dominated by China and value chain of the same is not well organized right now." This concern is very much in line with the fact that the country is still heavily dependent on importing lithium-ion batteries from China.

Few enterprises highlighted the need for subsidies, specifically for machinery diversification, indicating a financial incentive required for a smooth transition.

## 3.4 Assessment of impact on the workforce

The shift from ICE vehicles to EVs will have implications for a large proportion of the workforce currently engaged in the manufacturing of ICE vehicles, as well as those engaged in the value chain such as servicing and repairs. The digital transformation in the automobile industry will also require new set of skills from manufacturing to servicing.

The assessment of the impact of the EV transition on the workforce currently engaged in the manufacturing of ICE vehicle parts requires an understanding of the type of workers engaged in these enterprises, concerning their terms of engagement (such as permanent, contractual, and informal), education levels, skills levels, and job roles.

The impact evaluation on workers is based on the primary survey in the cluster and the evaluation of government information related to job roles, including the National Qualification Register and National Classification of Occupations (NCO) codes.

**Employment terms:** The largest share of workers at ACMs in the Pune cluster is contractual workers. This includes a sizable proportion of workers who do not have any employer-provided benefits. Besides, there is a significant proportion of informal workers. Overall, contractual and informal workers constitute more than two-thirds (71%) of the workers in ACMs. The informality is higher in micro and small enterprises. In OEMs, however, the proportion of formal workers is much higher, as was shared by officials during interviews.

**Table 3.2: Types of workers in ACMs**

| Worker type | Share (%) |
|---|---|
| Contractual workers | 35.7 |
| Informal workers (casual labour/ daily wager) | 35.5 |
| Permanent employees | 27.4 |
| Self-employed | 1.3 |

Source: iFOREST analysis

**Education levels:** A majority of the workers engaged in the ACMs have secondary or higher secondary level education. The analysis showed that, overall, about 37% of the workers have completed secondary-level education (tenth standard), and nearly 34% have completed higher secondary education. Additionally, 14.4% possess vocational or specialized training through ITI/diploma/certification courses.

The overall assessment shows that the workers engaged in the ACMs have basic education, and thus their ability to adapt to the new EV ecosystem with the help of necessary support, will be possible.

**Table 3.3: ACM type-wise education levels of workers**

| Education level (% of workers) | Large | Medium | Small | Micro | Total |
|---|---|---|---|---|---|
| Not literate | 0 | 4.8 | 3.1 | 0.5 | 2.4 |
| Middle standard (up to 8th class) | 0 | 4.8 | 3.7 | 6.3 | 4.8 |
| Secondary standard (up to 10th class) | 40 | 24.1 | 21.4 | 59.5 | 37.1 |
| Higher secondary standard (up to 12th class) | 20 | 24.1 | 46.0 | 28.9 | 33.7 |
| ITI/Diploma/ Certification course | 19.8 | 27.8 | 17.8 | 2.8 | 14.4 |
| Graduate | 20 | 13.4 | 7.9 | 1.7 | 7.1 |
| Post Graduate | 0.2 | 0.9 | 0 | 0 | 0.2 |

Source: iFOREST analysis

**Skill levels:** A majority of the workforce in the auto sector is considered semi-skilled or skilled given their job roles (thus the nature of work) and the training received. However, a large proportion of the workforce (80%) relies on on-the-job learning or training. Additionally, 11.8% of workers are self-taught, primarily through online courses or independent study, to acquire vocational skills. Only 15% of the workers were found to have completed formal vocational training.

**Table 3.4: ACM type-wise vocational training of workers**

| Type of training received (% of workers) | Large | Medium | Small | Micro | Total |
|---|---|---|---|---|---|
| Did not receive any vocational Training | 0 | 4.2 | 3.0 | 0.5 | 2.4 |
| On-the-job learning/training | 80 | 41 | 70 | 89.6 | 70.9 |
| Self-Learning | 10 | 26 | 6.8 | 8.1 | 11.8 |
| Formal Vocational training | 10 | 28.8 | 20.2 | 1.7 | 14.8 |

Source: iFOREST analysis

## SKILLING MECHANISMS IN ACMs

The skilling strategy adopted by a majority of ACMs is in-house skilling. The predominant mode of training for auto sector workers is on-the-job learning/training (about 71%), highlighting the hands-on nature of skill development in the industry.

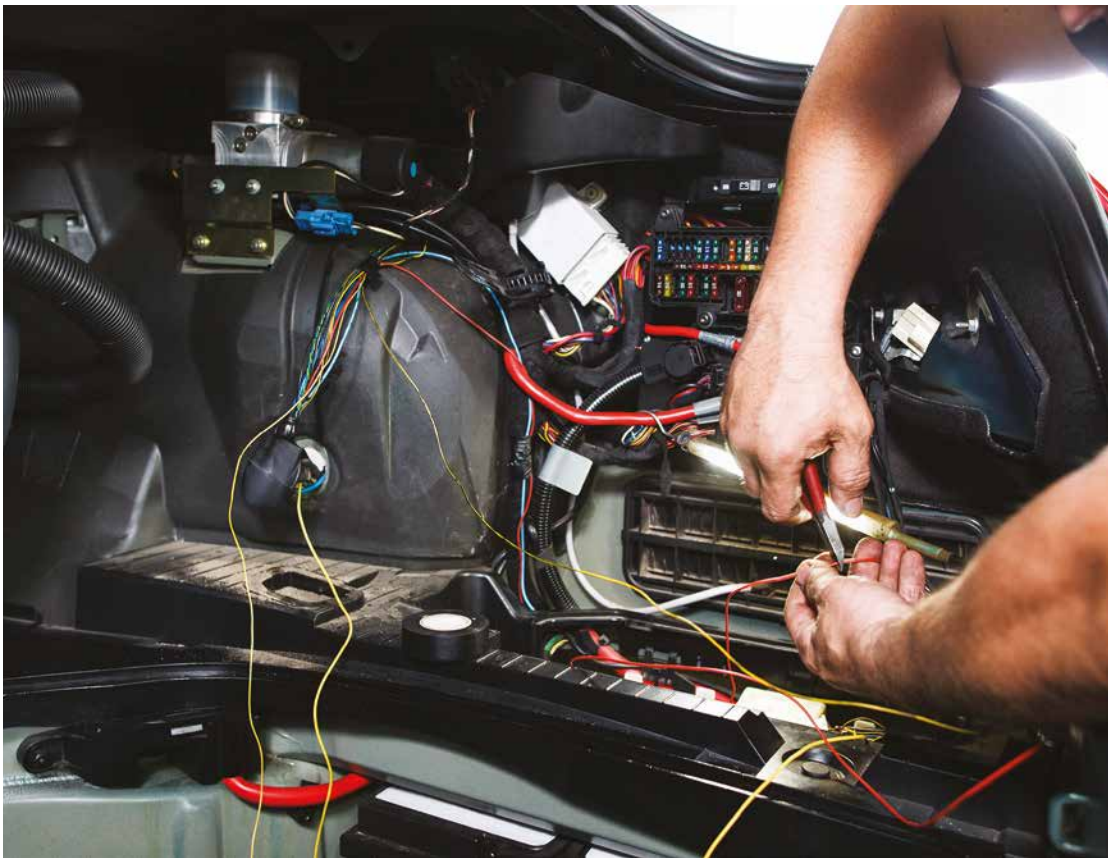
Overall, more than 90% of the surveyed ACMs reported conducting on-the-job training for workers. Some of the ACMs (about 13%) were also found to engage with the skilling centers to train their workers. However, the dependence on OEMs for skill training is very low. Only 4% of the enterprises were found to have some sort of dependence on the OEMs for training.

While on-the-job training is prevalent, the budget for providing proper training remains limited. This is particularly true for micro and small enterprises. Over 92% of the micro enterprises indicated having no budget allocated for training. Among small enterprises, about 53% indicated having no separate budget.

Medium enterprises, however, have budget allocations for training. About 45% of the surveyed enterprises in this category indicated a budget of above ₹5 lakhs. Large enterprises uniformly allocate budgets, with 50% allocating above ₹5 lakhs and the other 50% allocating between ₹2 to 5 lakhs.

Concerning EV-related training initiatives, most of the ACMs are not engaging in them. In fact, only 16% of the ACMs said EV-related training is currently required.

The overall approach to skilling by the ACMs highlights the limitation of resources and variability in the financial commitment to training initiatives. This will be an important area for intervention in the event of EV transition for the MSMEs. Also, there is minimal awareness of EV related training requirements among small and micro enterprises. Therefore, awareness generation will also be important.



**Job roles:** The assessment of workers engaged in various job roles in the Pune cluster shows that the workers are engaged in a wide range of tasks, from assembly and machining to quality management and supervision. Most of the job roles that the workers are engaged in are related. Overall, 27% of the workforce was found to have machining job roles. The other significant percentage of the workforce are welders (10.9%) and fitters (7.8%). Besides, over 9.3% of the employees/workers are supervisors.

## JOB ROLES IN AUTOMOBILE SECTOR

There are various job roles that the workers are engaged in the ACMs and the OEMs. A comprehensive analysis of all job roles in the automobile ecosystem was done considering various secondary data sources, including the National Qualification Register and National Classification of Occupations (NCO) codes, and interviews with representatives of ACMs and OEMs.

The analysis of job roles shows that there are at least 564 job roles in the entire automobile sector. About 54% of them are related to manufacturing, followed by servicing and repairing accounting for an additional 16%. Overall, 70% of all the job roles are in manufacturing and service/repair. Besides these, Research and Development (R&D) and dealerships are two other key segments that account for 13.3% and 10.5% of job roles respectively.

**Table 3.5: Category-wise job roles in the auto ecosystem**

| Job role categories | Number and share of job roles |
|---|---|
| Dealership | 59 (10.5%) |
| EV Charging Stations/Fuel pumps | 21 (3.7%) |
| Manufacturing | 304 (53.9%) |
| R&D | 75 (13.3%) |
| Service/Repair | 90 (15/9%) |
| Supply chain and logistics | 15 (2.6%) |
| **Total** | **564 (100%)** |

Source: iFOREST analysis

The education and skill levels of workers as per the job roles (564) have been further evaluated considering the National Skills Qualification Framework (NSQF). The analysis shows that most of the auto sector workforce falls between NSQF levels 4 and 5. These two levels generally represent jobs such as operators/ technicians and managers. People working at NSQF 4 and 5 also have at least a higher secondary level education. Ideally, most of them are graduates, including those completing courses from polytechnic institutes or ITIs. Around two-thirds of the auto sector job roles are between these two categories.

**Table 3.6: Total number of job roles in the auto ecosystem according to NSQF levels**

| NSQF levels | Examples of auto job roles | Number of job roles | | |
|---|---|---|---|---|
| | | Non-manufacturing | Manufacturing | Auto ecosystem total |
| Level 2 | Press shop assistant/ helper, automotive washer | 13 (2.2%) | 20 (6.6%) | 33 (2.6%) |
| Level 3 | Mechanical assembles | 21 (5.3%) | 19 (6.2%) | 40 (4.8%) |
| Level 3.5 | Toolroom operator, die maker | 9 (2.7%) | 39 (12.8%) | 48 (6.8%) |
| Level 4 | Press operator, technicians | 77 (26.2%) | 82 (26.9%) | 159 (25.7%) |
| Level 4.5 | Production in charge | 25 (9.5%) | 13 (4.3%) | 38 (6.9%) |
| Level 5 | Quality control engineer | 58 (24.6%) | 108 (35.5%) | 166 (33.6%) |
| Level 5.5 | Sales manager | 5 (2.3%) | 5 (1.6%) | 10 (2.22%) |
| Level 6 | Designer, chip programmer | 46 (23.4%) | 18 (5.9%) | 64 (15.53%) |
| Level 7 | Regional manager | 6 (3.6%) | 0 | 6 (1.7%) |
| **Total** | | **260 (100%)** | **304 (100%)** | **564 (100%)** |

Source: iFOREST analysis

**Table 3.7: Distribution of workforce according to job roles**

| Job roles | Share (%) |
|---|---|
| Assembler | 2.2 |
| Cast maker | 0.2 |
| CNC machine operator | 11.8 |
| Coil assembler | 0.2 |
| Cutter | 0.2 |
| Die maker | 2.2 |
| Drill operator | 2.7 |
| Electrical fitter | 0.4 |
| Fabricator | 0.5 |
| Fitter | 7.8 |
| Forging and casting operator | 0.8 |
| Grinder | 0.9 |
| Heat treatment specialist | 0.7 |
| Helper/Assistant | 7.1 |
| Laser cutting | 0.2 |
| Machine operator | 7.1 |
| Material handler | 1.7 |
| Metal finisher | 0.2 |
| Miller | 0.2 |
| Painter | 0.2 |
| Plastic moulding | 1.1 |
| Plating operator | 0.2 |
| Polisher | 1.1 |
| Press operator | 6.3 |
| Production technician | 3.6 |
| Programmer | 0.7 |
| Puller | 0.2 |
| Quality manager | 2.6 |
| Sales operator | 1.3 |
| Solderer | 0.2 |
| Spot welder | 1.4 |
| Spring winder | 0.2 |
| Stock handler | 0.7 |
| Supervisor | 9.3 |
| Technician | 3.5 |
| Tester | 0.2 |
| Trimming and cutting | 0.2 |
| Upholster | 0.4 |
| VMC operator | 8.2 |
| Welder | 10.9 |
| Wire winder | 0.2 |

Source: iFOREST Analysis

## 3.5 Transition preparedness of enterprises

The transition preparedness of enterprises was assessed based on the primary survey of the 100 enterprises. The findings indicate that ACMs have started transitioning to EV-related components.

The results show that 45% of ACMs in the Pune cluster are currently supplying EV parts to OEMs. These are primarily micro and small enterprises and are involved in manufacturing non-powertrain parts, such as body, moulding and process-based components, etc.

Additionally, 73% of ACMs are willing to diversify into EVs. Of these, 22% are currently manufacturing powertrain parts. The ones currently manufacturing powertrain parts intend to venture into the production of EV components such as traction motors, e-axle, EV batteries, and electrical parts required for EVs. The others intend to diversify into non-powertrain products that can be used in EVs with little or no adjustments.

Overall, the assessment of the transition preparedness of the ACMs and the strategies adopted by them suggests the following:

- Most enterprises are making a logical transition. They are expanding their business by supplying parts of the same sub-assembly for EVs, mostly non-powertrain parts. Only a small percentage were found to be transitioning/diversifying their business portfolio for manufacturing EV parts based on new opportunities in the EV ecosystem.
- The enterprises undergoing a logical transition are primarily small and micro. This is also a natural process for them as these enterprises cater to various non-auto industries based on product requirements.
- A small share of enterprises (about 7%), primarily medium and large, are doing an opportunistic transition by investing in R&D to move to the EV ecosystem.

Generally, the ACMs do not perceive any immediate threat from the EV transition. This is also because of the simultaneous growth in demand for ICE vehicles and EVs. However, they think that in the event of transition and for diversification of their manufacturing portfolios, it will be important to have other industries in the region where they can supply their parts. Also, if OEMs continue their procurement from the ACMs, the impacts can be minimised.

### PERSPECTIVE OF OEMs FOR TRANSITION TO EVs

The primary survey while captures the preparedness of ACMs for the transition to EVs, individual interviews with OEMs offer valuable insights of large businesses concerning the transition.

1. **Bajaj Auto:** Bajaj Auto envisions a manufacturing ratio of approximately 65:35 for ICE versus EV until 2023, acknowledging the coexistence of demand for ICE vehicles domestically. With a strategic alignment of production capacity for both ICE and EV, the company emphasizes skill development of the workforce anticipating future automation. The company has inaugurated its first skill centre (Bajaj Engineering Skill Centre) to address the skilled workforce demand in the evolving automotive landscape.
2. **Force Motors:** Force Motors highlighted the disruptive impact of EVs on the market, leading to increased payouts for workers and a surge in demand for skilled labour in the EV sector. The company predicted a greater impact on MSMEs due to financial constraints, limited capacity of investment in machinery, and a shortage of skilled labour.
3. **Mahindra:** Mahindra Group is expanding the hiring of workers for their EV business. The new job roles they are focussing on hiring include experts in battery cell assessment, system productivity, and mechanical design. The company is also introducing new job titles such as Chief of Climate Action and Future Mobility Expert to adapt to the evolving automotive landscape driven by EV technology, emphasizing AI/ML and app development coding.

Overall, the study of the Pune cluster shows that it is well diversified considering sub-assemblies and vehicle segments. The cluster has manufacturing units that cater to almost all sub-assemblies and vehicle segments.

There is also a predominance of SMEs in the cluster. These enterprises have a diversified manufacturing portfolio related to the auto and non-auto sectors. Even within the auto sector, the products of these enterprises, such as general component or moulding or process-based auto parts, such as jigs, fixtures, precision components, press tools components etc. are used across different assembly lines. However, the predominance of MSMEs makes the cluster vulnerable to any unplanned transition considering their limited financial resources, and low-capacity for technology adoption.

Concerning the workforce, about two-thirds of them are contractual and informal workers. They are however educated (with basic secondary or higher-secondary level education) and are semiskilled and skilled. Therefore, timely interventions of skilling and upskilling both by the government and the industry remain crucial for workforce transition. The skilling curriculum and mechanisms also need to be revised to improve the employability of the workforce in the EV ecosystem. Support from OEMs in terms of technology transfer, reskilling initiatives, and collaborative business models can be instrumental in ensuring a just and effective transition for these enterprises and the workforce.

04

# Assessment of Policy Landscape

# 4.1 Scope

The policy landscape of the automobile sector in India is multifaceted, encompassing national and state-level policies and plans that focus on promoting the sector's growth and supporting innovation and sustainability.

The policy evaluation is undertaken from the perspective of the sector's transition from ICE vehicles to EVs and its implications for businesses, jobs, and the environment. The analysis includes a review of critical national and state-specific policies in Maharashtra and how some key policies have impacted the EV transition in Maharashtra.

# 4.2 National-level policies

The national-level policies and plans related to the transition of the automobile sector can be broadly placed under four categories:

- Policies, plans and schemes focused on the overall growth of the automobile sector to make India an auto manufacturing and export hub;
- Policies, plans and schemes focused on the green transition of the sector, with a specific focus on EVs;
- Policies and schemes related to skilling and workforce development for the sector; and,
- Policies to support the MSMEs (as ACMs are dominated by such enterprises).

## A. Policy for the overall growth of the sector

The Automotive Mission Plan (AMP), first launched by the Ministry of Heavy Industries (MHI) in 2006, is one of the critical strategic plans by the Government of India (GoI) to boost the sector's growth, both in the domestic market and exports.

The plan first proposed for 2006-2016 targeted doubling the sector's contribution to the country's GDP to 10% by 2016 ($145 billion) by fostering both domestic market and exports.[1] In 2016, the plan was revamped, and the next phase for 2016-2026 was rolled out. The current plan outlines long-term objectives and strategies for the development of the automotive industry.[2]

Overall, the plan prioritizes four critical aspects for the sector:

i. Making the Indian automotive industry “among the top three of the world in engineering, manufacture, and export of vehicles and auto components”, making the sector “efficient and environment-friendly", and ensuring "affordable mobility of people and transportation of goods in India comparable with global standards".

ii. Make the Indian Automotive Industry a significant contributor to the "Skill India" programme, making it one of the most significant job-creating engines in the Indian economy.

iii. Promote safe, efficient, and comfortable mobility for every person in the country, with an eye on environmental protection and affordability through both public and personal transport options.

iv. Increase the Indian automotive industry's net exports. Vehicles and auto components have the potential to scale up exports to 35-40% of their overall output over the next ten years and make India one of the significant automotive export hubs in the world.

## B. Policy for the green transition of the sector

The GoI has implemented the National Electric Mobility Mission Plan (NEMMP) 2020 and has implemented schemes and programmes to accelerate the adoption of EVs, boost domestic manufacturing, and create employment opportunities.

**i. National Electric Mobility Mission Plan (NEMMP):** The NEMMP sets an ambitious target to achieve about 60 to 70 lakh sales of hybrid and electric vehicles year on year from 2020 onwards.

To support the penetrations of EVs, the plan underscored five key aspects[3];

- The need for developing schemes/programmes for generating demand;
- Incentivizing domestic manufacturing of EVs and related components;
- Supporting EV infrastructure;
- Promoting research and development (R&D); and,
- Creation of job and employment opportunities in the manufacturing segment and new related services.

In the subsequent years, several important schemes have been developed under the NEMMP to provide fiscal incentives for the adoption of EVs, development of capital assets (such as electric buses for public mobility and charging infrastructure), and to boost domestic manufacturing of automobile and automobile components, enhance government revenue and create jobs. The most significant ones include the Faster Adoption and Manufacturing of Hybrid and EV scheme (FAME I and II), the Production Linked Incentive (PLI) scheme for Automobile and Auto components (PLI-Auto), and the PLI scheme for rolling out the National Programme on Advanced Chemistry Cell (ACC) Battery Storage (PLI- ACC).

**ii. Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles (FAME):** The FAME scheme was initially launched in 2015 (Phase I) for four years, from April 1, 2015, to March 31, 2019. Phase I of the scheme with a budget outlay of ₹895 crores.[4] provided government incentives, including generating consumer demand for the adoption of EVs, deployment of electric and hybrid buses and development of charging stations across India. Besides, funds were provided to eminent institutes, such as the Automotive Research Association of India (ARAI), Indian Institute of Technology (IIT) Madras, IIT Kanpur, Non-Ferrous Material Technology Development Centre (NFTDC), Aligarh Muslim University (AMU) among others, for various technology development projects, setting up of a 'Centre of Excellence' for Advanced Research in electrified transportation, battery engineering, etc.[5]

The scheme's second phase (FAME Phase II), which commenced in April 2019, remains effective until March 31, 2024.[6] Phase II was initially notified for three years with a total outlay of ₹10,000 crores, including demand incentives (about 86% of the outlay) for the broader adoption of hybrid and electric vehicles, development of charging infrastructure, and other administrative and associated costs.[7] In February 2024, the MHI increased the budget for FAME II to ₹11500 crores.[8]

**Table 4.1: Outlay for implementation of FAME II till March 2024**

| Components | Budget outlay (₹ Crore) |
|---|---|
| **Subsidies (demand incentives) for the adoption of EVs (A)** | **7,048** |
| • Subsidies for two-wheeler | 5,311 |
| • Subsidies for three-wheeler | 987 |
| • Subsidies for four-wheeler | 750 |
| **Grants for the creation of capital assets (B)** | **4,048** |
| Electric buses (e-buses) | 3209 |
| EV charging stations | 839 |
| **Others (administrative, outreach, etc.) (C)** | **404** |
| **Total (A+B+C)** | **11,500** |

Source: Ministry of Heavy Industries and Public Enterprises, February 2024

According to information from December 2023, about ₹5,250 crores in subsidies have been given to EV manufacturers for the sale of over 11.6 lakh EVs. The GoI has also sanctioned the deployment of 6,862 e-buses and 7,580 EV charging stations (7,432 stations to three Oil Marketing Companies and 148 to other entities).[9]

**iii. Phased Manufacturing Programme:** The Phased Manufacturing Programme (PMP) has been introduced under Phase II of the FAME scheme. The key objective of the scheme is to indigenize production and increase domestic value addition, thereby "increasing the domestic value addition and creating employment opportunities."[10]

The scheme proposes a graded custom duty structure for vehicle parts and components. The 2019 notification under which the programme was promulgated outlines Basic Customs Duty (BCD) to be levied on various types of vehicles and components coming into the country, in several cases doubling the BCD as compared to the duty effective during that time. For example, the BCD for lithium-ion cells has doubled from 5% to 10%, and that of the battery packs has doubled from 5% to 15%. Similarly, the BCD on parts used to manufacture EVs has increased to 15%.[11]

**iv. Production Linked Incentive:** The Production Linked Incentive (PLI) Scheme of the GoI aims to boost domestic manufacturing of particularly high-value automotive technology and related components. These are two PLIs that have been launched for the auto sector.

These include the PLI for the rollout of the National Programme on Advanced Chemistry Cell (ACC) Battery Storage as notified in June 2021,[12] and the PLI for the Automobile and Auto Components Industry, as notified in September 2021.[13]

The PLI for ACC Battery Storage envisages setting up a cumulative manufacturing capacity of 50 GWh for ACCs and an additional cumulative capacity of 5 GWh for Niche ACC Technologies by 2028-2029. A total of ₹18,100 crores have been earmarked for this.

Through this scheme, the GoI intends to optimally incentivize domestic and overseas potential investors to set up advanced storage technologies, emphasizing maximum value addition. Some of the critical conditions and targets under the scheme are:

- The selected beneficiary firm will have to commit to setting up a minimum of 5 GWh of ACC's manufacturing facility (the total annual cash subsidy to be disbursed by the government will be capped at 20 GWh per beneficiary firm). The manufacturing facility, as proposed by the beneficiary firm, would have to be commissioned within two years.
- For niche ACC technologies, the minimum threshold capacity is 500 MWh.
- The beneficiary must achieve a domestic value addition of at least 25% within two years (at the mother unit level). By five years, the domestic value addition should rise to 60% either at the mother unit (in the case of an integrated unit) or at the project level (in the case of a hub-and-spoke structure).

The subsidy payable to the beneficiary firm (every quarter) under the scheme is sale-linked. For example, the subsidy amount will be determined as

*Applicable subsidy amount/kWh x Percentage of value addition achieved during the period x Actual sale of ACCs (in KWh)*

Overall, the subsidy provided will be capped at 20% of the sale price (net of GST).

The PLI scheme for the Automobile and Auto Components Industry has been promulgated initially for five years with an outlay of ₹25,938 crores (effective from FY2022-23 to FY2026-27). The overall objective of the scheme is to boost domestic manufacturing of Advanced Automotive Technology (AAT) products and attract investments in the automotive manufacturing value chain.

The PLI scheme seeks to benefit makers of advanced automotive technologies or auto components. Like the PLI for ACCs, the subsidy payable to the beneficiary firm under the scheme is linked to the sale value.

**Table 4.2: Targets and objectives of the PIL–Auto scheme**

| Scheme segments | Target segment | Objective | Incentive type |
|---|---|---|---|
| Champion OEM Incentive Scheme | Applicable on battery electric vehicles and hydrogen fuel cell vehicles of all segments, including two-wheelers, three-wheelers, passenger vehicles, commercial vehicles, tractors, etc. | Address the cost disabilities related to Advanced Automotive Technology vehicles faced by OEMs | Sale value linked; Applicants will be entitled to receive growth incentives (% benefit) on "Determined Sales Value" (DSV). The threshold DSV for the first year is ₹125 crore for all companies. |
| Component Champion Incentive Scheme | ACMs or its group company(ies), OEMs or its group company(ies) and new non-automotive investor company or its group company(ies). | Identify and incentivize auto component champions that can achieve global scale of operations and become 'automotive champions' for the auto-component manufacturing sector related to Advanced Automotive Technology. | The sale value is linked; applicants will be entitled to receive growth incentives (% benefit) on DSV. The threshold DSV for the first year is ₹25 crore for all companies. |

Source: Ministry of Heavy Industries and Public Enterprises, September, 2021

**v. Other fiscal incentives:** In addition to the key policy aspects, the GoI has taken some important measures to encourage the adoption of EVs.

The Ministry of Finance has proposed tax rebates for the adoption and use of EVs under the Goods and Services Tax (GST) Act, 2017 and the personal income tax. The following have been enforced accordingly:

- The GST on EVs will be reduced from 12% to 5% and on chargers/ charging stations for EVs from 18% to 5% with effect from August 2019.[14]
- The Income Tax Act specifies a 'deduction' from the gross total income of an individual in respect of the interest payable on the loan taken from any financial institution for purchasing an EV if the loan has been sanctioned by the financial institution during the period from April 1, 2019, to March 31, 2023.[15]

The Ministry of Road Transport and Highways had also announced fiscal incentives for battery-operated vehicles. It has been notified that such vehicles will be given green license plates and exempted from permit requirements. The Ministry also issued a notification advising states to waive road tax on EVs, which also has implications for reducing the initial cost of EVs.[16]

Recently, the GoI also approved a scheme to promote India as a manufacturing destination for EVs with the latest technology. The policy is designed to attract investments in the EV space by reputed global EV manufacturers. The minimum investment required by the companies is ₹4,150 crores (approximately $500 million). The companies will have to set up manufacturing facilities in India in three years and attain a localization level of 50% by the fifth year.[17]

## C. Policy for skilling and workforce development

Skilling and developing the future workforce is a key issue for the automobile sector, considering its significance for India's manufacturing sector and the industry's projected workforce requirement. The Ministry of Skill Development and Entrepreneurship (MSDE) predicts that by 2030, India's EV industry will generate 1 crore direct jobs.[18]

Concerning policies supporting skill development for the automobile sector, the Ministry of Skill Development and Entrepreneurship (MSDE) is the nodal Ministry that oversees most of the essential schemes related to skilling and workforce development. Two schemes are most significant in this regard: the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) and the National Apprenticeship Promotion Scheme (NAPS).

The PMKVY was launched in 2015 and implemented by the National Skill Development Corporation (NSDC). Under this scheme, short-term training is typically offered. Currently, about 13% of the training centres established under the PMKVY offer training courses related to the automobile sector.[19]

**Table 4.3: Auto sector-related courses under PMKVY**

| Parameters | Number |
|---|---|
| Total centres[20] | 2,640 |
| Total number of centres offering training on automobile-related job roles (40 job roles) | 523 (training capacity of approximately 54,000 individuals) |

Source: PMKVY Dashboard

Another critical component of the PMKVY is Recognition of Prior Learning (RPL), a form of a bridge course. Under this, individuals with prior learning experience or skills are assessed and certified. Implementing agencies for this component are the Sector Skill Councils (SSCs) or any other agencies designated by MSDE/NSDC.

The NAPS was launched in 2016 and is implemented by NSDC and the Directorate General of Training (DGT). Under the scheme, there are 34 apprenticeship courses, of which eight are related to EVs and electronics.[21] In the last five years (since 2018), 6 lakh apprentices have been trained under NAPS for the automobile sector.[22] The scheme also incentivizes enterprises to train their employees by providing 25% of the stipend that the apprentice receives from the company (with a cap of ₹1,500 per individual).

Apart from short-term training supported through the schemes mentioned above, long-term training concerning the automobile sector is offered through government institutes like ITIs, IITs, NITs, and other government and private engineering universities and colleges with courses/curricula related to the auto sector's job roles. Besides these, OEMs and ACMs directly offer enterprise-based training (mainly on-the-job training).

Several skilling programmes for the automobile sector have been implemented by the ASDC (not under government schemes). However, most of these programmes are not specifically designed to cater to the needs of the EV industry.

## D. Policies for support of the MSMEs

In the automobile sector, the ACMs are dominated by MSMEs. Therefore, policies targeting MSMEs are highly significant for the sector's holistic growth.

The GoI enacted the MSME Act in 2006 to facilitate the promotion and development of MSMEs and increase their competitiveness.[23] Towards this purpose, the government needs to support the development of skills of employees, technological upgradation, cluster development, and infrastructure and marketing support, among others. Section 9 of the Act stipulates that the "*Central Government may, from time to time, facilitate the promotion and development and enhance the competitiveness of micro, small and medium enterprises, particularly of the micro and small enterprises, by way of development of skill in the employees, management and entrepreneurs, provisioning for technological upgradation marketing assistance or infrastructure facilities and cluster development of such enterprises to strengthen backward and forward linkages, specify, by notification, such programmes, guidelines or instructions, as it may deem fit.*[24]

Over the past years, the government has developed several schemes to support the growth of MSMEs and workforce development. Some of the key ones relevant to the automobile sector are as follows[25]:

- **Credit Guarantee Scheme for Micro and Small Enterprises (CGTMSE):** The scheme aims to support first-generation entrepreneurs by providing credit guarantees for collateral-free loans to micro and small enterprises, particularly those lacking collateral. To foster entrepreneurship and financial inclusion, guarantee coverage varies based on enterprise size, women's ownership, location, etc. The Ministry of Micro, Small and Medium Enterprises and Small Industries Development Bank of India (SIDBI) has established the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) to implement the scheme.
- **The Micro and Small Enterprises Cluster Development Programme (MSE-CDP)** aims to enhance the growth of MSMEs by addressing common challenges like technology enhancement, skill improvement, and market access. It focuses on creating or upgrading infrastructural facilities in industrial areas or clusters, including promoting green and sustainable manufacturing technologies within these clusters.

- **MSME Champions Scheme:** The MSME Champions Scheme is a comprehensive initiative to promote competitiveness and innovation among MSMEs. It focuses on enhancing productivity, reducing wastage, and fostering global competitiveness.
- **Prime Minister's Employment Generation Programme (PMEGP):** This scheme provides financial assistance for setting up self-employment ventures and boosting employment opportunities. It offers credit-linked subsidies for new micro-enterprises in the non-farm sector, with margin money subsidies ranging from 15% to 35% of the project cost, depending on the sector and beneficiary category. Beneficiaries contribute 10% or 5% of the project cost, and banks sanction the remaining project cost.
- **The Pradhan Mantri Mudra Yojana:** This scheme aims to empower MSMEs by facilitating access to affordable credit, enabling them to establish and expand their businesses. The scheme aims to foster entrepreneurship and growth of MSMEs by supporting micro-businesses with essential financial resources.

## Observations on national-level policies

The analysis of the national-level policies to boost EV growth shows that the GoI has implemented several essential policy measures in recent years. However, specific outstanding concerns need to be considered to ensure comprehensive measures for a just transition of the sector. Some of the critical aspects that need attention are as follows:

i. There is no consistent national-level policy to guide a green and inclusive transition in the automobile sector. The policy environment guiding the transition to EVs remains fragmented. Various ministries and departments are involved in developing policy measures to support some of the central schemes currently guiding the EV transition.

   For example, the MHI remains responsible for developing policies, plans, and schemes to promote the automobile industry, including e-mobility. Besides, the Ministry of Road Transport and Highways (MoRTH), Ministry of Housing and Urban Affairs (MOHUA), Ministry of Power (MoP), Ministry of Housing and Urban Affairs (MOHUA) and the Ministry of Finance (MoF) have developed a set of supporting measures over the years to support necessary infrastructure development, promote the use of non-conventional fuels and electrification of mobility, and provide necessary fiscal incentives to support the growth of the sector from both supply and demand side. The MSDE also remains significant for implementing skilling and workforce development programmes in partnership with various implementation agencies.

   Such fragmentation in policies leads to sub-optimal outcomes. Therefore, the government must define long-term, consistent, coherent targets and plans across ministries.

   The absence of a comprehensive and stable policy framework has also been highlighted by the Department-related Parliamentary Standing Committee (PSC) on Industry in their report on 'Promotion of Electric Vehicles in the Country', tabled in the Rajya Sabha (Upper House) in December 2023. The Committee recommends that the "Government should strive towards formulating a consistent and stable national policy on electric mobility so that a propitious environment is created for the EV industry to promote a sustainable and clean transportation system in the country".[26]

ii. The policies significantly focus on incentives for demand generation and the adoption of EVs (personal vehicle ownership, which can undermine sustainable urban development): For example, over 61% of the revised budget outlay under FAME II is in the form of a subsidy for the adoption of two, three, and four-wheelers. The incentives under the PLI schemes are also linked to the sell value, which, therefore, indirectly relates to generating personal demand.

   While generating demand for EVs is important, focusing on personal vehicle ownership will be challenging from the overall sustainability perspective in urban areas. Without simultaneous (and increased) promotion of green and efficient public transport and related infrastructure and networks, linear growth in private ownership of EVs risks undermining overall urban sustainability.

iii. The policies incentivizing manufacturing, such as the PLI schemes, are focused on high-value manufacturing. The schemes are designed to attract investments and increase domestic manufacturing of AAT and high-value products. While this is important to reduce India's import dependence on tech and high-value products, considering that MSMEs dominate the existing domestic manufacturing segment, their ability to avail of these incentives and improve/upgrade their products is limited. While they can benefit through a

trickle-down effect, their direct interests may not be safeguarded. However, from a transition perspective, the medium, small and micro enterprises involved in auto component manufacturing remain most vulnerable.

iv. The national schemes focus only on workforce development and transition. The existing skilling programmes are not designed to support the large-scale workforce transition necessary to align with the EV transition.

v. There is limited scope for supporting advanced technology and research. While various schemes are aimed at enabling EV adoption and boosting domestic manufacturing, policies also need to focus on addressing the dearth of advanced research and technology at the national and state levels. As per the NITI Aayog, this "will impact the global competitiveness of the Indian EV industry."[27] unless necessary measures are adopted. R&D investments will not only increase business competitiveness but will also be crucial for boosting jobs.

## 4.3 State-level policies in Maharashtra

The state policy architecture considering the transition of the automobile sector to EVs can be placed under three categories:

- Policy to strengthen EV growth;
- Policy to support MSMEs and clusters; and,
- Skilling plans and initiatives.

### A. Policy to strengthen EV growth

**Maharashtra Industrial Policy:** The state government's Industrial Policy, which Was developed in April 2019 and is valid for five years, has identified "Electric Vehicle (manufacturing, infrastructure, and servicing)" as one of the "thrust sectors" to promote industrial development towards high-tech emerging sectors and generate employment.[28] The significance of a state EV policy has been emphasized to enable the adoption and manufacturing of EVs in the state.

**Maharashtra EV Policy:** The State Government launched the latest EV Policy in July 2021 with the primary objective of accelerating EV adoption. An in-depth review of the state EV policy of Maharashtra shows the following key trends[29]:

**(i) Setting targets for EV penetration:** The state policy has set specific targets for EV adoption for private vehicles and public transport. These include:

a) EVs should contribute to 10% of new vehicle registrations by 2025. Specifically, the target for 2Ws is 10%, for 3Ws 20%, and for 4Ws, it is 5%.

b) In six targeted urban agglomerations, i.e. Mumbai, Pune, Nagpur, Nashik, Aurangabad and Amravati achieve 25% electrification of public transport and 25% electrification of fleet operators, fleet aggregators, and last-mile delivery vehicles by 2025.

c) Transition of 15% of Maharashtra State Road Transport Corporation's (MSRTC) existing bus fleet to electric.

Besides, per the policy, from April 2022, all new government vehicles in major cities will be electric, marking a significant step towards sustainability.

**(ii) Demand-side incentives:** The policy provides several demand-side incentives to scale up the adoption of EVs. These include purchase subsidies for various passenger vehicles, goods carriers, and commercial vehicles. Other fiscal incentives, such as tax exemptions and vehicle registration fee waivers, have also been given.

**(iii) Supply-side side incentives:** Among the supply-side incentives, the key ones include:

a) **Incentives for charging infrastructure:** The policy incentivizes public and semi-public charging stations (PCS and SPCS). For slow stations, the incentive is 60% of the cost, with a ceiling of ₹10,000 per PCS/SPCS; for fast stations, the incentive is 50% of the cost, with a ceiling of ₹500,000 per PCS/SPCS.

b) **Manufacturing incentives:** All the EVs and associated industries shall be granted the incentives/ benefits elucidated under the 'D+' category of mega projects/other categories irrespective of their location (as per the Industrial Policy, 2021). This translates to the exemption of electricity and stamp duty.[30]

c) **Incentives for high-tech manufacturing:** The state is actively encouraging the establishment of Giga factories for manufacturing advanced chemical cell (ACC) battery production by extending several incentives under its industrial policy. The state further offers up to 50% capital subsidies for equipment acquisitions related to fast-charging facilities.

**(iv) Supporting green public transport:** As noted above, the policy has set a target of transitioning 15% of the existing fleet of MSRTC to electric. The incentive is set at 10% of the vehicle cost, with an incentive cap of ₹20 lakh per vehicle. The state policy also encourages financial institutions and banks to offer preferential interest rates for e-autos, goods carriers, and taxis.

**(v) Workforce development and employment:** The policy emphasizes workforce development in coordination with institutions and OEMs. The policy notes that the state shall revise existing courses and create new courses on the EV ecosystem to be offered by the state ITIs. In partnership with relevant/interested OEMs and service providers, the government shall develop skill enhancement centres to deliver vocational courses on the EV ecosystem. The skill enhancement centres will aim to train the ICE mechanics/workforce in repairing and servicing EVs and charging stations.

The EV Policy has also identified allocations for its implementation. An expenditure of ₹930 crores has been earmarked for the next four years since the time of enactment of the policy. Of this, ₹890 crores will be spent through the Transport Department, and the remaining will be spent through the Energy Department. The policy further notes that the "funds for implementation of the Maharashtra Electric Vehicle Policy, 2021 will be aggregated from various instruments like green tax on registration of old vehicle and green cess on fossil fuels, etc[31]."

**Table 4.4: Key provisions of Maharashtra EV Policy**

| Policy segment and incentive category | Category | Particulars | Details of incentives |
|---|---|---|---|
| EV targets | EV penetration targets | EV registration targets | 10% of all new registered vehicles to be BEVs by 2025. |
| | | State transport bus targets | 15% of state transport buses in the state. |
| | | Government vehicle targets | All new vehicles and vehicles leased for Govt. official purposes shall be BEVs starting 1st April 2022. |
| | Charging infrastructure targets | | 2500+ charging stations in top five cities by 2025.<br>Four highways/expressways to have public charging stations at 25 km distance (on both sides) by 2025. |
| | Investment targets | | One Gigafactory for manufacturing of advanced chemistry cell (ACC) batteries.<br>Become the top producer of BEVs in India regarding annual production capacity. |
| Purchase subsidy for passenger vehicles | 2W | Incentive (₹/kWh) | 5,000 |
| | | Max. amount (in ₹) | 10,000 |
| | | No. of vehicles | 1,00,000 |
| | 3W | Incentive (₹/kWh) | 5,000 |
| | | Max. amount (in ₹) | 30,000 |
| | | No. of vehicles | 15,000 |
| | 4W | Incentive (₹/kWh) | 5,000 |
| | | Max. amount (in ₹) | 1,50,000 |
| | | No. of vehicles | 10,000 |

*Table 4.4 continued*

| Policy segment and incentive category | Category | Particulars | Details of incentives |
|---|---|---|---|
| Purchase subsidy for goods carriers and commercial vehicles | 3W | Incentive (₹/kWh) | 5,000 |
| | | Max. amount (in ₹) | 30,000 |
| | | No. of vehicles | 10,000 |
| | 4W | Incentive (₹/kWh) | 5,000 |
| | | Max. amount (in ₹) | 1,00,000 |
| | | No. of vehicles | 10,000 |
| | Buses | Incentive (₹/kWh) | 10% of vehicle cost |
| | | Max. amount (in ₹) | 20,00,000 |
| | | No. of vehicles | 1,000 |
| Tax incentive-motor vehicle tax | 2W, 3W, 4W, 4W - Hybrid | Exemption (%) | 100 |
| | | No. of vehicles | All |
| Vehicle registration fee waiver | 2W, 3W, 4W, 4W - Hybrid | Exemption (%) | 100 |
| | | No. of vehicles | All |
| Charging infrastructure | Slow PCS | Incentive (₹/kWh) | 60% of cost |
| | | Max. amount (in ₹) | 10,000 |
| | | No. of vehicles | 15,000 |
| | Fast PCS | Incentive (₹/kWh) | 50% of cost |
| | | Max. amount (in ₹) | 5,00,000 |
| | | No. of vehicles | 500 |

Source: Maharashtra EV Policy, 2021

## B. Policy to support MSMEs and clusters

The state Industrial Policy emphasizes some other necessary thrust areas/policy aspects essential to support a green transition of the automobile sector and ensure that the manufacturing sector remains vibrant. Two aspects are particularly relevant in this regard:

- Promotion of MSMEs; and,
- Promotion of clusters.

Considering the promotion of MSMEs, the policy covers the enterprises as per the definition of the MSME Development Act, 2006, and the small industries with fixed capital investment (FCI) of "up to ₹50 crores".[32] The policy outlines various fiscal incentives for promoting these enterprises. These incentives are offered in the form of interest subsidies, stamp duty exemptions, electricity duty exemptions, power subsidies, and an Investment Promotion Subsidy (IPS) on Gross State GST paid.[33]

Considering clusters, the Industrial Policy recognizes that promoting clusters is a "cost-effective and an inclusive strategy to ensure competitive and improved MSME units". The policy stipulates fiscal assistance for cluster promotion up to ₹10 crores, except for those in industrial areas of A and B zones.[34]

## C. Skilling plans and initiatives

Investments in skilling and reskilling programmes for the workforce, both by the government and the industries, will be essential to help workers adapt to new roles within the emerging EV sector and make them more adaptable to the changing job market. Skilling will also be essential to develop a future-ready workforce for the EV ecosystem.

A review of Maharashtra's current skill development schemes and programmes shows that these are primarily focused on information technology (IT), automobile, accounting, construction and the healthcare sectors.[35]

Concerning the automobile sector, in addition to implementing the Central Government schemes, two schemes developed by the State Government have skilling provisions related to the sector. These include the Pramod Mahajan Kaushalya Udyojakta Vikas Abhiyan (PMKUVA) and the Kiman Kaushalya Vikaas Kaarayakram (KKVK).[36]

The PMKUVA, launched in September 2015, aims to train people aged between 15 and 45 years with subsequent job placement.[37] Under this scheme, the state's youth can get free of cost training in all districts.[38]

The KKVK aims to support training programmes and courses tailored to a specific district's demands. The scheme targets candidates within the district to support local capacity and reduce outmigration.[39]

Overall, considering central and state government schemes, 583 skill development centres are operating in Maharashtra that offer skill training courses related to the automobile sector. Among the central schemes, the noteworthy ones are PMKVY and the National Urban Livelihood Mission (NULM), which is particularly leveraged for auto sector-related training in Maharashtra.

However, the status is grossly inadequate when considering the EV-related courses offered through these centres. Out of a total of 106 auto-sector-related courses offered through the skill centres under these schemes and programmes, less than 5% (6 courses) are EV-related[40].

**Table 4.5: Number of skilling centres with automobile courses**

| Scheme | No. of centres having automobile courses |
|---|---|
| NULM | 239 |
| PMKVY | 101 |
| PMKUVA | 142 |
| KKVK | 74 |
| Others (including CSR supported) | 27 |
| **Total** | **583** |

Source: iFOREST analysis based on information from Maharashtra Skill Development Society, 2024

## Observations on state-level policies and limitations

The Government of Maharashtra has several policies that can collectively be leveraged to strengthen a policy ecosystem at the state level to support a just transition of the automobile sector.

For example, the state EV Policy notes targets for the EV transition, which is important for developing targeted plans and investments. Additionally, there is an emphasis on transforming public transport, with a commitment to achieving 100% electric public transport by 2027. The policy also focuses on workforce development. On the other hand, the state Industrial Policy recognizes the need to support MSMEs and clusters. The policy has proposed fiscal and non-fiscal incentives to promote this.

However, both the EV Policy and the Industrial Policy need to be further strengthened to support a sustainable and just transition of the automobile sector.

The following are some key aspects that need attention in the EV policy.

(i) The EV Policy offers various demand-side incentives to foster EV adoption. In contrast, the supply-side incentives outlined are limited.[41]

The Economic Advisory Council (2023) to the Government[42] and the Mahratta Chamber of Commerce, Industries and Agriculture (MCCAI),[43] have advised strengthening the supply-side incentives for EV manufacturing. This will be essential to maintain and boost the manufacturing ecosystem of ACMs that form the backbone of the auto sector in the state and provide large-scale employment. The policy can be strengthened by providing reimbursement for state GST (SGST) and capital subsidies, especially for MSMEs.

(ii) The state policy also does not provide any incentive related to employment generation. For example, some state policies, such as Tamil Nadu, offer reimbursement of the employer's contribution to the employers' provident fund (EPF) for all new jobs created (until 2025).[44]

(iii) The policy must be strengthened to support ease of business for ACMs who want to transition to the EV ecosystem. Consultations with ACMs suggest there are outstanding concerns about procuring multiple permits from various departments, which is often a deterrence for them.

Creating single-window clearance mechanisms will be important to support ACMs in diversifying their businesses and promoting entrepreneurship.

(iv) PLIs under the EV policy are primarily restricted to high-tech manufacturing (such as establishing Giga factories for manufacturing of ACC) and can be availed by large manufacturers. However, considering that the existing manufacturing segment is dominated by MSMEs, their ability to avail of these incentives and improve/upgrade their products is limited. While they can benefit through a trickle-down effect, their direct interests may not be safeguarded.

(v) The policy also does not provide any specific mechanisms (though it notes the intention) for boosting R&D investments, which will be essential for creating new industries and employment opportunities.

Concerning the state Industrial Policy, while it incentivizes MSMEs in underdeveloped industrial areas, support for MSMEs needs to be strengthened for all industrial areas in the event of an EV transition. Most importantly, the support for MSMEs and clusters noted in the Industrial Policy is not designed comprehensively to support these enterprises in the event of a transition.

On aspects of skilling and workforce development, the schemes operating at the state level suffer from similar limitations as Central schemes. The schemes being implemented in Maharashtra have very limited training courses related to EVs. As mentioned earlier, the analysis of various automobile-related courses shows that out of a total of 106 auto-sector-related courses offered through various skill centres, less than 5% (6 courses) are EV-related.

## 4.4 Impact of policies on EV transition

The combined evaluation of national and state EV policies shows that the policy environment has strengthened, particularly in the last five years. For national policies, this includes the commencement of FAME II in April 2019 and the PLI scheme in 2021. The Maharashtra EV Policy also came into effect at the state level in July 2021. All of these have been mainly focused on incentivizing EV adoption.

i. **Impact on EV adoption:** An analysis of EV registration data (of 2Ws, 3Ws and 4Ws) over the last six years shows that registration has drastically increased post 2021. From a total registration of 4,453 EVs in 2018, the number increased to 135,041 in 2022 and 191,696 in 2023. Overall, the most significant number of registrations are for 2Ws, followed by 4Ws and 3Ws; however, for 4Ws, the growth has been most steep, with a 576 times increase in registration since 2018. Both FAME II and the state EV Policy evidently have boosted the adoption of EVs in the state.

The review of fund disbursal under FAME II further shows that the state has remained the front-runner in leveraging the funds. Over the last five years (from the scheme's inception in 2019 until December 2023), Maharashtra has received over ₹1100 crores, combining various vehicle segments. This is about 17.4% of the total disbursal (₹6,308 crores) under FAME II to various states. Five states account for over 54% of the FAME II disbursal (besides Maharashtra, the other key states are Karnataka, Delhi, Gujarat, and Kerala).

Besides personal vehicles, e-buses have also been sanctioned under FAME in Maharashtra. As per the latest information from the Ministry of Heavy Industries (March 2024), a total of 1,110 buses have been sanctioned and 759 deployed. Out of this, 664 buses have been deployed under FAME II. The total deployment of e-buses in the state is also the highest, constituting over 31% of the total e-buses deployed in the country.

**Table 4.6: EV registration in Maharashtra pre and post-FAME II and state EV Policy**

| Vehicle category | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|
| 2W | 3,133 | 5,728 | 5,066 | 23,674 | 117,556 | 168,036 |
| 3W | 1,299 | 1,134 | 1,056 | 1,939 | 6,444 | 11,569 |
| 4W | 21 | 112 | 747 | 3,687 | 11,041 | 12,091 |
| **Total** | **4,453** | **6,974** | **6,869** | **29,300** | **135,041** | **191,696** |

Source: Vahan dashboard, as accessed in March 2024

**Table 4.7: Funds disbursed to Maharashtra under FAME II**

| Vehicle segment | Total No. of vehicles sold | Total amount disbursed (₹ crore) |
|---|---|---|
| e-2W | 265,935 | 960.2 |
| e-3W | 10,065 | 74.5 |
| e-4W | 3,198 | 76.7 |
| **Total** | **279,198** | **1,111.4** |

Source: Ministry of Heavy Industries, 2024

ii. **Impacts on EV charging infrastructure:** The state's charging infrastructure has also benefitted from implementing national and state EV policies. The state has 3,079 public charging stations, the highest in India, constituting over 25% of the country's total (as of February 2024). Out of them, 13 have been commissioned under FAME II. This means the state EV Policy has played a major role in augmenting the charging infrastructure.[45]

iii. **Impacts on localized EV manufacturing:** Concerning the benefits leveraged under the PLI scheme, which incentivizes both manufacturing and sales of EVs (as the actual realization of the incentive is sale value linked), there has yet to be a discernible impact. The PLI scheme for the Automobile and Auto Component Industry has attracted a proposed investment of ₹74,850 crores. So far, 95 applicants have received approvals under the scheme and remain eligible to receive the benefits once they fulfil the scheme's requirements related to the DSV. This includes 20 applicants under the Champion OEM Incentive scheme with a proposed investment of ₹45,016 crores and 75 applicants under the Component Champion Incentive scheme with a proposed investment of ₹29,834 crores.[46]

Among the companies that have received approvals, several are key players in Maharashtra. This includes Ashok Leyland Limited, Mahindra and Mahindra Limited, Tata Motors Limited, Bajaj Auto Limited, and Tata Autocomp Systems Limited, among others.

While the proposed investments can hugely boost the manufacturing of EVs and various components in the state, the incentives are yet to be realized, considering the interim period of production and sales. According to the Central Government response in the Parliament (Lok Sabha) in February 2024, the disbursement of the incentive under the scheme will begin from the financial year 2024-25.[47]

The review of the impacts of the national and state EV policies shows that the state has hugely benefitted from EV adoption and the development of charging stations. Regarding leveraging the monetary benefits of national flagship schemes such as FAME, Maharashtra remains the top beneficiary. The state is also likely to leverage benefits under the PLI Scheme for the Automobile and Auto Component Industry, given the presence of some of the country's top industry players in the state and considering that several of them have also received approvals. Therefore, strengthening the national policies and schemes alongside state policies will help boost the EV transition.

Overall, it can be concluded that while the EV policy(ies) provides a strong impetus for EV penetration, the overall policy ecosystem remains inadequate and fragmented to support a just transition of the automobile sector in the state. As the deep dive study of the Pune cluster shows, comprehensive policies and plans will be required to ensure a just transition of the ACMs, particularly the MSMEs, the workforce (including informal workers and those in the value chain), and overall ensure a low-footprint and environmentally responsible transition. For this, the state will need to develop a comprehensive framework for just transition of the automobile sector.

05

# Roadmap for a Just Transition of the Automobile Sector

**The automobile** sector is a critical industrial sector in Maharashtra, driving the state's manufacturing economy, supporting millions of jobs, and overall boosting the state's economy. The growing EV industry has been identified as a thrust sector under the state Industrial Policy (2019).[1] In their report, the Maharashtra Economic Advisory Council (EAC) 'Roadmap to becoming a $1 trillion economy' has also noted 'electric vehicle manufacturing' as one of the six sun-rise industries to drive the state's economy in the coming years.[2]

Such recognition, and the need to move to clean mobility to tackle the climate crisis and environmental pollution, will drive the transition from ICE vehicles to EVs in the state. However, this transition needs to be sustainable and inclusive. It should consider the transition needs of various types of enterprises, particularly MSMEs, currently engaged in manufacturing ICE vehicle components, the regions where these industries are concentrated, and the associated workforce. At the same time, the growth needs to be environmentally responsible.

Therefore, a roadmap for a just transition of the automobile sector should be based on a vision of creating a sustainable and inclusive automobile future for the state. Strong policies, strategic plans, and robust institutional mechanisms should support the vision.

## 5.1 Just transition vision

Transitioning to clean mobility, such as from ICE to EV and other sustainable transportation solutions, offers numerous environmental benefits, including reduced GHG emissions, improved air quality, and decreased reliance on fossil fuels. However, like any significant shift, it will also result in disruptions across the automobile sector's value chain, including the workforce. At the same time, the transition will need to be environmentally sustainable, considering the energy and material requirements involved in its production, use, and disposal.

Therefore, India and states like Maharashtra must seize the opportunities of transformation backed by technology and innovation while ensuring workers' resilience and security, supporting affordable and accessible sustainable choices by citizens, and reducing the lifecycle impact of EVs.

Considering this, the just transition vision of the automobile sector should be based on four pillars:

i. Technology and skilling;
ii. Vibrant green manufacturing;
iii. Sustainable mobility choices, and
iv. Green energy and material circularity.

Each of these pillars is outcome-oriented and should guide the development of practical and holistic policies, plans, and investment measures.

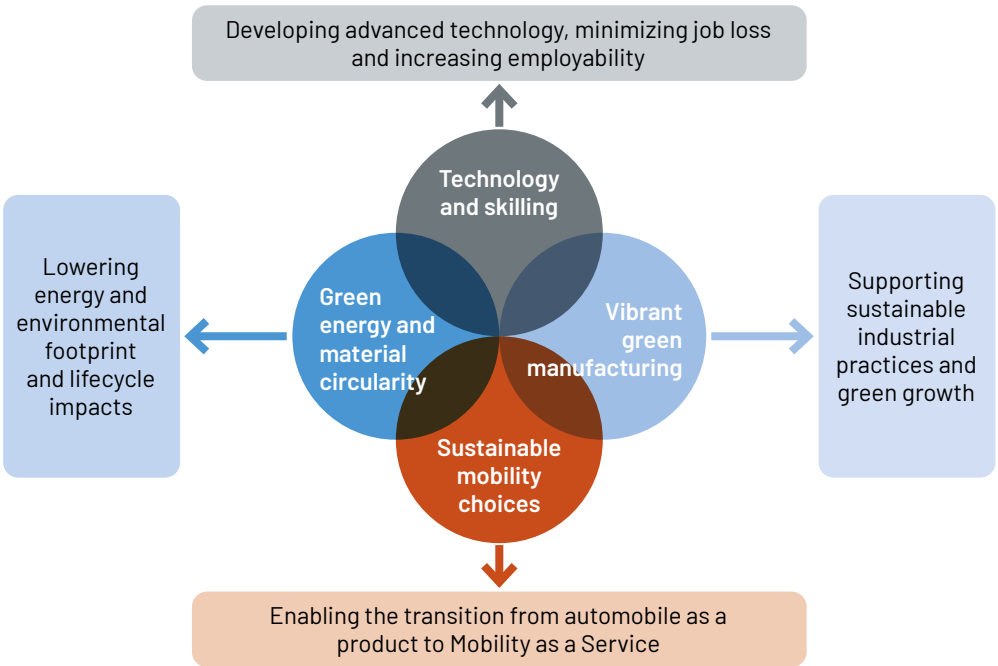
**Technology and skilling:** The first pillar, technology and skilling, is perhaps the most critical pillar of a just transition in the automotive sector. The advancement of technology and the development of human resources must progress together to ensure the availability of skilled personnel to leverage technological capabilities fully. Simultaneously, technology must be designed and implemented to reduce job displacement and improve job prospects. Consequently, the planning of skill-enhancement programmes and investment in education, including vocational training, should be executed so that the growth in human resources is in sync with technological advancements and evolving demands. Similarly, research and development (R&D) and policies governing the transition to new technologies should consider employment and worker employability implications.

**Vibrant green manufacturing:** The second pillar, vibrant green manufacturing, is positioned to make the state a hub of green automobile manufacturing. This pillar will promote green manufacturing practices by both OEMs and ACMs and support the state's economic development and green growth agenda.

**Sustainable mobility choices:** The third pillar, sustainable mobility choices, will enable the transition from automobiles as a product to Mobility as a Service (MaaS). It will promote sustainable urban mobility, reduce congestion and pollution, and support diversifying income opportunities around clean mobility.

**Green energy and material circularity:** The fourth pillar, green energy and material circularity, should reduce the life cycle impact of EVs, from energy and material use to end-of-life material management. Collectively, these pillars will aid the progress toward a sustainable, economically vibrant, just, and inclusive automobile future.

**Figure 5.1: Pillars of just transition of the automobile sector**



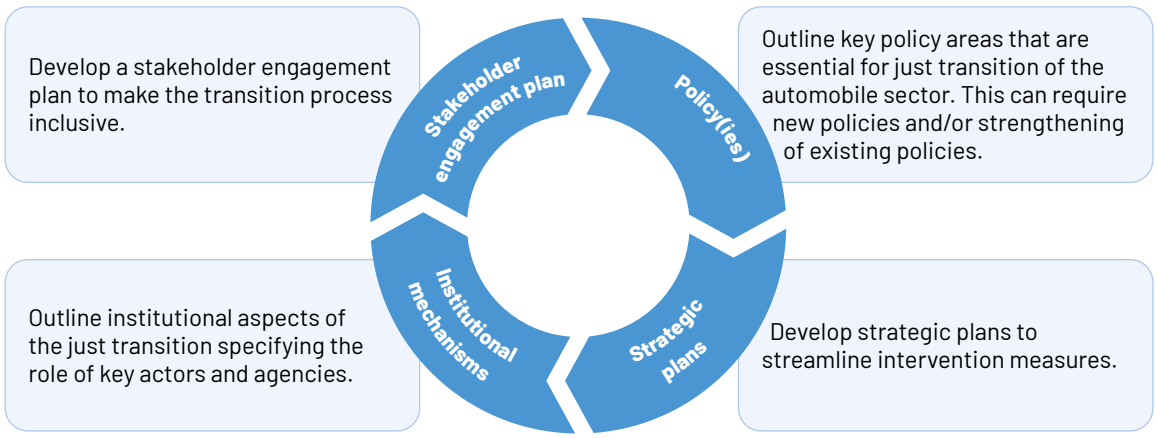

Source: iFOREST analysis

## 5.2 Just transition framework for the automobile sector in Maharashtra

Just transition of the automobile sector will require the cooperation and engagement of the Central and the State Governments (s), along with strong support and action by the industries. The states will specifically be at the forefront of developing plans, programmes, and institutional mechanisms to address just transition measures.

Considering the state's important role in steering the transition, a comprehensive just transition framework for the automobile sector will be required at the state level. The framework should have four components: policy(ies), strategic plans, institutional mechanisms (including the role of key agencies), and a stakeholder engagement plan.

**Figure 5.2: Key components of just transition framework for the automobile sector**




Source: iFOREST analysis

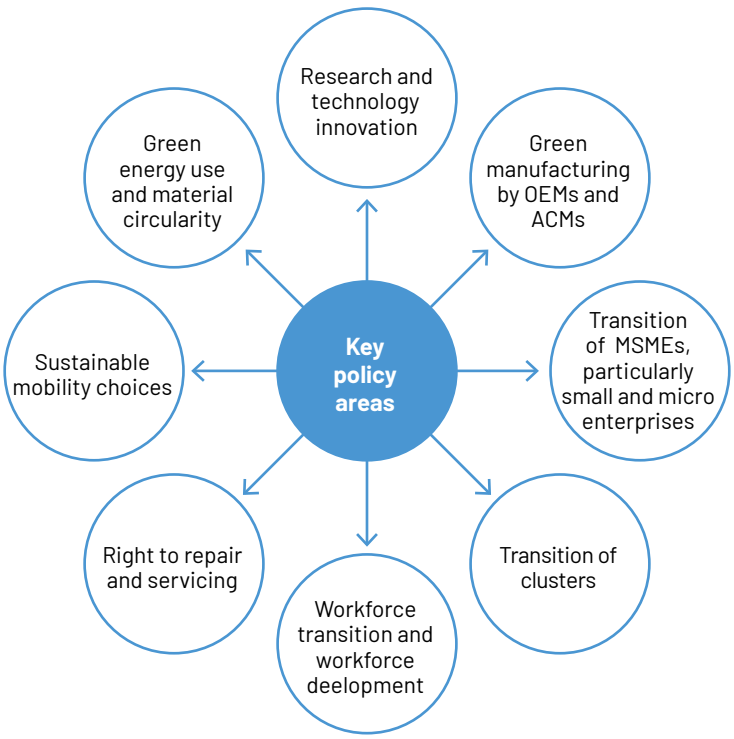
The state-level framework for a just transition of the automobile sector will primarily guide the development of state policies, strategic plans, allocation of dedicated financial resources, support stakeholder dialogue and engagement, and ensure the implementation of just transition measures in a participatory manner.

## 5.2.1 Policy areas

The review of the current policy landscape in the state shows that while the state has an EV policy and also has policies and programmes in place targeted towards development for MSMEs, skilling of workers, etc., the policy architecture for a sustainable, just, and inclusive transition of the automobile sector needs to be more comprehensive and integrated.

Therefore, a comprehensive policy framework will be required to support a just sector transition. The policies should consider the unique challenges the state may encounter in the event of a transition from ICE vehicles to EVs and outline provisions to minimize and mitigate such challenges. The critical policy issues the state should consider are outlined below.

**Figure 5.3: Key policy areas for just transition of the automobile sector**




Source: iFOREST analysis

**a. Research and technology innovation:** Maharashtra should leverage its expertise in engineering and innovation, along with a strong capital market, to become a national and global leader in developing and adopting cutting-edge automotive technologies and position itself as a hub for automotive innovation.

The following policy interventions will be necessary for this:

(i) Strengthen the state EV Policy to support and incentivize the establishment of EV technology R&D centres (centers of excellence) and innovation hubs.

(ii) Develop a dedicated EV R&D agency to support researchers/research institutions with funding and technical assistance.

(iii) Support collaboration between leading universities, research institutions, and industry players to foster innovation.

**b. Green manufacturing:** The state should promote a competitive green manufacturing ecosystem to cater to domestic demand and capture the export market. The Industrial and EV policies can be strengthened to promote green manufacturing by OEMs and ACMs.

For OEMs, the following policy measures can be considered:

(i) Provide financial incentives to adopt green manufacturing practices, such as utilizing renewable energy (RE), investing in energy-efficient equipment, implementing green procurement measures, material reuse, etc.

(ii) Support R&D investments to innovate green manufacturing practices.

(iii) Establish guidelines and standards for green manufacturing.

(iv) Promote industry benchmarking and reporting on environmental performance metrics.

For ACMs, the following policy measures can be considered:

(i) Formulate specific guidelines and standards for green manufacturing tailored to the scale and capabilities of ACMs.

(ii) Provide technical assistance to ACMs in the MSME category in adopting green manufacturing practices.

(iii) Provide financial incentives such as grants, subsidies, and tax incentives to MSMEs for adopting green manufacturing technologies and practices.

(iv) Ensure access to credit and risk capital to support investments in green manufacturing.

(v) Support ACMs' ease of doing business through single-window clearance mechanisms. Also, small parcels of' plug and play' plots can be leased to improve the scope of land availability for business diversification in the EV ecosystem.

(vi) Facilitate partnerships between ACMs, OEMs, technical experts, and research institutions to transfer knowledge and technologies.

**c. Transition of MSMEs:** In Maharashtra, the automobile industry manufacturing segment is dominated by MSMEs. Overall, 97% of all automobile enterprises in the state are small and micro-scale.

ACMs, especially small and microenterprises, will face multiple challenges during an EV transition. These include financial challenges due to their limited resources and access to adequate and institutional credit, capacity challenges concerning adopting new technologies, challenges with diversifying their businesses, and challenges with reskilling support for the workers. A multipronged approach will be necessary to support these enterprises.

Following are some of the critical policy interventions that will be necessary to support the transition of MSMEs to the EV ecosystem and minimize disruption in their business and for the workers:

(i) Strengthen the state Industrial Policy to cover all aspects of MSME enablement, including technology support, access to financing, subsidies and incentives, business/trade promotion, and capability building.

(ii) Develop specific policy instruments to support financing and access to finances for MSMEs. This can include the following measures:

  a) Develop schemes for short-term collateral-free credit access to micro and small enterprises.

  b) Enable the adoption of an Open Credit Enablement Network (OCEN) to provide collateral-free credit to MSMEs.

  c) Leverage the network of cooperative banks to take advantage of MSME credit schemes, such as CGTMSE and Pradhan Mantri MUDRA Yojana (PMMY).

(iii) Establish a dedicated transition fund to support the MSMEs, particularly micro and small enterprises, including their workforce. (see sub-section 5.4 for details)

(iv) Support ease of business for MSMEs and their access to finances by formalising micro and small enterprises.

(v) Provide training subsidies to enterprises for business development to help them diversify and scale up their businesses.

**d. Transition of clusters:** The State Government should institutionalise the requirement for a cluster transition plan to support targeted measures for the transition of the automobile clusters.

The plans should minimize any prospective negative impacts of the transition from ICE vehicles to EVs on ACMs, workers, and those engaged in the value chain. The plans should identify gaps and outline intervention measures, including associated costs and required investments for a just transition of the clusters. (see sub-section 5.2 for further details).

**e. Workforce transition and workforce development:** A central issue of the automobile sector just transition is the transition of the workforce currently engaged in the conventional auto sector to ensure adaptability and secure employment in the EV value chain. Besides, it is also essential to prepare the future workforce for the evolving industry requirements.

The assessment of the workforce engaged in ACMs, particularly in MSMEs, shows that many need to be made transition-ready to the EV ecosystem through skilling and upskilling. However, the skill ecosystem analysis indicates a significant gap between the existing programmes and the job roles and skills required to cater to the EV transition. At the enterprise level, workforce skilling measures are primarily restricted to OEMs and large enterprises.

Therefore, a comprehensive workforce transition policy in the automobile sector will be required to support the existing workforce impacted by the transition and prepare a future-ready workforce. The workforce transition policy needs to address interventions required by the government and enterprises.

As part of the government measures, the following are some of the critical interventions that are required:

(i) Foster engagement between the implementation agencies of government training programmes, such as the training institutes, such as the ITIs or Skill Sector Councils, with the industry for designing curriculum, evaluating training outcomes, and providing certification, among others.

(ii) Redesign the short and long-term training programmes considering the job roles and educational and technical requirements of the EV value chain. The training curriculum should include modules on advanced EV technologies, battery management systems, and sustainable manufacturing practices.

(iii) Foster collaboration between the training institutes and educational institutions to design credit-based, continuous learning-oriented courses.

(iv) Set up new skill development institutions by attracting private investments.

(v) Engage technology partners to design on-demand 'Phygital' learning courses for up-skilling existing workforce.

(vi) Promote on-the-job quick capsule training while ensuring no wage reduction for workers participating in such training.

(vii) Support standardized certification criteria for EV-related skills.

(viii) Women should be a key focus of workforce transition. Adopting measures to improve their access to foundational skills and skilling programmes and increase their employability should ensure equal employment opportunities for women.

As part of the industry's responsibility, enterprises, particularly the OEMs and large ACMs, should be mandated to develop a 'Workforce Transition Plan' in consultation with the auto manufacturing clusters. (see sub-section 5.2 for details).

Overall, innovative strategies must be designed by the government, industry and skilling agencies/institutions to support workforce transition and development for various categories of workers, including women. These strategies must also be aligned with technological changes and innovation in the automobile sector.

**f. Right to repair and servicing:** The transition of the automobile sector is not isolated and will influence the local economy. As on-ground experiences in major auto clusters show, there is significant income dependence on the servicing sector. A large share of workers in servicing and repair are also informal workers.

Policy measures can be developed to reduce the vulnerability of these workers. A key one in this regard will be to mandate a 'Right to Repair and Servicing' policy to enable EV manufacturers to involve local service centers in repair and servicing and retain employment.

**g. Sustainable mobility choices:** The future of clean mobility should be intricately related to environmentally responsible choices and lifestyle practices. As the EV transition accelerates, it should be balanced by considering the sustainability of our urban spaces and supporting a shift in the idea of mobility.

Two policy interventions will be required to foster sustainable mobility, particularly in urban areas. These include:

(i) Boosting a clean public transport system; and,

(ii) Fostering the idea of Mobility as a Service (MaaS).

**(i) Boosting clean public transport:** While EVs play a crucial role in decarbonising transportation, relying heavily on individual EV ownership will pose challenges to urban livability. For example, the anticipated penetration of EVs, particularly 2Ws by 2030, will exacerbate congestion problems in cities and towns.

Therefore, clean public transport systems, such as electric buses (e-buses), must be scaled up. This will further require interventions on the following (but not limited to) aspects:

a) Planning for charging infrastructure and integrating charging infrastructure into existing urban infrastructure such as bus depots and transit hubs.

b) Route optimisation of e-buses.

c) Integrating e-buses with other modes of transportation, such as e-bicycles, and shared mobility services, among others, to address the last-mile connectivity challenge.

**(ii) Mobility as a Service (MaaS):** The idea of MaaS is gaining momentum in transportation and urban policy.[3] MaaS aims to shift from traditional car ownership models towards shared mobility models, where convenience and comfort can be ensured. The uptake of MaaS could bring about considerable environmental and societal benefits such as lowering individual carbon footprint, reducing congestion, and boosting service sector employment opportunities in the clean mobility ecosystem.

**h. Green energy use and material circularity:** Achieving environmental sustainability in the EV transition requires a holistic approach that considers the entire lifecycle of EVs and addresses energy and material use at every stage. While EVs produce zero emissions at the tailpipe, their overall environmental impact depends on the source of electricity used to charge them. Using renewable-based energy will be essential to minimize the carbon footprint of EVs.

Similarly, batteries for EVs require significant amounts of raw materials such as lithium, cobalt, and nickel. Sustainable mining practices, battery recycling, and research into alternative battery chemistries with fewer rare or toxic materials will be essential for reducing material extraction and use and overall minimising environmental impacts.[4]

The policies and incentives for EVs should integrate RE use, reuse of materials, and disposal provisions, among others, to support an environmentally responsible EV transition.

## 5.2.2 Strategic plans

Strategic plans should be developed at the enterprise and district/cluster levels to streamline the process of just transitioning the automobile sector, design effective measures, and ensure effective planning and implementation measures. The following two strategic plans will be essential.

**a. Workforce Transition Plan:** The OEMs and large ACMs should be mandated to develop a 'Workforce Transition Plan' in consultation with representatives of ACMs (belonging to the MSME category) in the

auto clusters. The plan should be output-oriented and include information regarding (but not limited to) the following aspects):

(i) The number of workers impacted by the transition at various levels, including job roles.

(ii) Assess the need for transition support, including reskilling/skilling, temporary assistance, mobility assistance, etc.

(iii) Outline a plan for providing transition support, including support for reskilling and skilling, to enterprise employees and workers.

(iv) Outline a reskilling/skilling plan for ACM workers engaged with/suppliers of the OEMs.

(v) Identify the scope of engagement with governments, institutions, or other skilling agencies to support workers where OEMs will not be directly engaged.

(vi) Outline a monitoring and evaluation strategy with key performance indicators (KPIs) to measure the transition plan's success and monitor implementation progress and success.

**b. Cluster Transition Plan:** Considering the concentration of ACMs in various clusters and the unique challenges and opportunities of each cluster (given the ACMs' business portfolio, workforce dependence, local industrial activities, business environment, etc.), the development transition plans for each cluster will be necessary.

A cluster plan(s) should be output and outcome-oriented and include the following components:

(i) Detailed information related to the cluster. This shall include (but not be limited to) the following:
   a) A detailed profile of the ACMs operating in the cluster, including their manufacturing portfolio.
   b) Details of manufactured parts for automobile sectors.
   c) Supply of products.
   d) Yearly turnover.
   e) Share of annual turnover related to the auto industry.
   f) Worker distributions and their engagement terms (permanent, contractual, informal).
   g) Assessment of education and skills among workers and gaps.
   h) Trends in transitioning to the EV ecosystem and opportunities.
   i) Local industrial environment and opportunities.
   j) Local skilling ecosystem.
   k) Any other relevant information.

(ii) A SWOT (strengths, weaknesses, opportunities, and threats) analysis of the cluster considering the issues of EV transition.

(iii) Outlining a five-year transition strategy and plan, including key intervention areas.

(iv) Outlining the required financial resources.

The government can revisit the plan every five years and revise it based on implementation status.

## 5.2.3 Institutional mechanisms and role of key agencies

A just transition of the automobile sector will require the cooperative engagement of various stakeholders at the state and district levels. The following are some key roles that the State Government, district agencies, industry and industry associations, and other stakeholders must be entrusted with in the event of an EV transition.

### a. Role of the State Government

The State Government, in association with district agencies and industry actors, will have a crucial role in developing policies, strengthening institutional mechanisms, and mobilizing final resources for a just transition of the automobile sector.

Following are some of the critical roles of the State Government:

**(i) Developing a comprehensive, just transition policy framework for the automobile sector:** The government shall formulate a comprehensive, just transition policy framework for the automobile sector to support a well-guided just transition process, balancing the imperatives of net positive environmental, social, and economic outcomes. The policy will create the obligation to implement just transition measures by various agencies and the industry.

To develop the comprehensive policy framework, the government shall institute necessary reforms in the existing policies related to EVs, industry and MSMEs, and workers, among others, and formulate new policies as required. The state government should also integrate supporting provisions in other related state policies, such as the RE and Urban Mobility policies.

**(ii) Facilitating the development of district/cluster-level transition plans:** The State Government should facilitate the development of district or cluster-level transition plans for auto clusters. The State Industry Department can be the nodal agency for developing the plan. The department may develop the plan in coordination and consultation with other state departments, the District Industry Centre (DIC), industry bodies, OEMs and ACMs representations, workers' representatives, skilling agencies, and other concerned stakeholders.

The government needs to develop guidelines to facilitate the engagement of stakeholders, the procurement of data, and the development of the cluster transition plan. The government may engage with external experts/agencies to develop the plan as necessary.

**(iii) Appointing a State Automobile Sector Just Transition Task Force:** The government may appoint a State Automobile Sector Just Transition Task Force to inform the State Government and the DIC on developing strategies, plans, and designing implementation just transition measures. The Task Force will engage with various stakeholders, including workers, representatives of ACMs and OEMs, industry bodies, worker unions, skilling agencies, research and innovation organizations, civil society organizations, and other concerned stakeholders at the state and district levels.

**(iv) Creating dedicated funds:** The government must develop dedicated funds to implement just transition measures, specifically targeting enterprises with limited resources and ACM workers (including contractual and informal workers engaged regularly by the ACMs).

Two particular funds are necessary:

**a) MSME transition support fund:** Create a dedicated MSME transition fund to support the MSMEs, particularly micro and small enterprises. The fund can be used for the following purposes:

- Providing grants, low-interest loans, or subsidies to MSMEs to upgrade their manufacturing processes, adopt new technologies, and support the reorientation of enterprises involved in ICE component manufacturing towards EV components.
- Assisting in accessing new markets to diversify their customer base.
- Providing transition support for permanent and contractual workers, especially skilling and reskilling, related to the job roles in the EV sector.

**b) Skill development fund:** Create a dedicated Skill Development Fund, including the development of foundational skills, to particularly support informal workers, women, and other disadvantaged groups to improve the scope of their employability in the EV ecosystem. This fund can leverage multiple financing sources, including CSR funding, innovative public-private partnership models, etc.

## b. Role of the district agencies

District administration and agencies such as the District Industrial Centers (DIC) will have a vital role in facilitating the development of local plans (such as the district/cluster transition plans) and implementing just transition measures concerning the transition MSMEs, particularly the micro and small enterprises. Some of the critical functions of the DICs can be as follows:

(i) Provide data concerning the details of enterprises (MSMEs), workforce dependence, etc., to support the development of transition plans for auto clusters.

(ii) Disseminate information on government policies, schemes, subsidies, incentives, market opportunities, technology, and skill development programmes.

(iii) Support ACMs belonging to the MSME category and entrepreneurs in obtaining licenses, clearances, and certifications to start and operate a business efficiently.

(iv) Collaborate with training institutes and organiszations to conduct skill development programmes and workshops for MSMEs to improve their competitiveness.

(v) Assist MSMEs in accessing financial support by connecting them with banks, financial institutions, and government schemes for technology upgradation, business diversification, modernizsation, etc.

(vi) Link the MSMEs with research institutions, technology providers, and government initiatives promoting technological advancements to improve their capacity for technology adoption.

(vii) Promote coordination and peer learning among MSMEs.

## c. Role of industrial bodies and institutions

Maharashtra has strong industry bodies and associations that can play a pivotal role in facilitating a just transition of the automobile sector. Collaboration between the State Government and these industrial bodies will strengthen the implementation measures. The following are some of the key industry bodies of the state in this regard.

**(i) Maharashtra Industrial Development Corporation (MIDC):** MIDC plays a crucial role in Maharashtra's industrial development by providing infrastructure support and facilitating investment in various sectors. Collaborating with MIDC can help set up EV manufacturing units and charging infrastructure in industrial zones across the state.

**(ii) Chamber of Commerce(s):** Maharashtra has two important Chamber of Commerce that have been active since the pre-independence period- the Maharashtra Chamber of Commerce, Industry and Agriculture (MACCIA), and the Mahratta Chamber of Commerce, Industry and Agriculture (MCCIA). The chambers represent a broad spectrum of industries and businesses in Maharashtra.

By engaging with MACCIA and MCCIA, the state government can garner support from businesses for EV adoption through incentives, subsidies, and awareness programs. The industry bodies can also be instrumental in the capacity building of ACMs, supporting them in business diversification and business development in the EV ecosystem.

**(iii) Auto Cluster Development and Research Institute (ACDRI):** ACDRI is a facility that provides support to small and medium enterprises in auto clusters. The institute can play a pivotal role in facilitating cluster planning, supporting R&D considering the resources and capacity of the MSMEs, and skill development and capacity building.

Given the institution's expertise, data access, and engagement with enterprises in auto clusters, ACDRI can play an instrumental role in cluster planning.

The government can engage ACDRI to conduct studies/assessments to identify resource, infrastructure, and capacity gaps among ACMs for transition to the EV ecosystem. The institute can collaborate with the DIC and industry stakeholders to develop comprehensive transition plans for the cluster as per the directions and guidelines of the State Government.

**(iv) Automotive Research Association of India (ARAI):** The ARAI, affiliated with the Ministry of Heavy Industries, GoI, and recognized as a Scientific and Industrial Research Organisation (SIRO), can play a crucial role in R&D and technology innovation to support the transition. The institute's expertise in automotive engineering, environmental research, and other aspects already provides the necessary ecosystem.

Besides, national-level agencies such as the Automotive Component Manufacturers Association of India (ACMA) can work closely with small and micro ACMs to facilitate the production of components required for EVs, thereby supporting the transition.

### d. Role of skilling institutions and agencies

Several skilling institutions and agencies in Maharashtra focus specifically on the automobile industry. In coordination with the government and industry bodies, these institutions can support the crucial intervention of skilling and upskilling existing workers and the development of a future-ready workforce.

The following are some of the critical roles that these institutions can have:

(i) Develop and offer specialised training programmes for automobile sector workers to upgrade their skills in EV technology. These can include training in EV assembly, maintenance, repair, and servicing.

(ii) Develop courses and modules on EV technology, battery systems, charging infrastructure, and related areas.

(iii) Offer entrepreneurship development programmes, mentorship, and access to funding opportunities for aspiring entrepreneurs and startups focusing on EV technologies.

(iv) Conduct awareness programmes and workshops on the opportunities in the EV industry, the skills required, etc., to create a positive perception and encourage stakeholder participation in the transition.

## 5.2.4 Stakeholder engagement plan

Building stakeholder engagement and consensus at the state and district levels will be essential to support a just transition of the automobile sector and achieve positive outcomes. The government and industry should develop an effective communication and engagement strategy to ensure sustained engagement with various stakeholders during the transition process. The engagement process needs to specifically remain sensitive to the cause and engagement of contractual and informal workers and women, who constitute a large proportion of the workforce.

In conclusion, a successful just transition roadmap for the automobile sector will hinge upon the obligation to work toward a shared vision of a clean mobility future without compromising the interests of businesses, workers, and the environment. Also, for the effective implementation of state policies and plans, the development of comprehensive and robust policies and institutional mechanisms by the Central Government will be necessary.

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